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Behind the Seawall

Historical Archaeology Along the San Francisco Waterfront

Volume 1

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BEHIND THE SEAWALL:

HISTORICAL ARCHAEOLOGY ALONG THE SAN FRANCISCO WATERFRONT

Volume 1

Prepared by Archeo-Tec for the
San Francisco Clean Water Program

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1981

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1981 San Francisco Clean Water Program

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EDITOR'S PREFACE AND ACKNOWLEDGMENTS

> The time will certainly come, and I believe at no distant day, when for commercial reasons as well as for the preservation of our beautiful and magnificent harbor, San Francisco will have a grand sea-wall around its entire waterfront. Then with a deep and capacious sewer on the inside of this wall with its outflow into deep water, the refuse organic matter of our dwellings and streets will, before decomposition takes place, be conveyed to the Pacific Ocean.
>
> Health Office, San Francisco, July 1, 1877 (written exactly 100 years before commencement of construction of the North Shore and Channel Outfalls segments of the San Francisco Wastewater Management Program)

The appearance of **Behind the Seawall** represents the fruition of a three-year program of historical archaeology along the San Francisco waterfront. This program was accomplished in conjunction with the design and construction of the North Shore and Channel Outfalls segments of the ambitious city-wide, federally funded sewer expansion program currently underway throughout San Francisco. Sponsoring the archaeological work was the San Francisco Wastewater Management Program (now called the Clean Water Program), created in 1976 in response to the passage of the Federal Water Pollution Control Act (Public Law 92-500) mandating an immediate and massive cleanup of the nation's navigable waterways. The Environmental Protection Agency, the State of California Water Resources Control Board, and the City and County of San Francisco funded the project. Research was conducted in accordance with the provisions of the federal Archaeological and Historic Preservation Act of 1974 (Public Law 93-291) and the State of California Environmental Quality Act of 1970.

The editor responsible for compiling a cultural resources report such as **Behind the Seawall**--that is to say, a project both legislatively mandated and tax-supported--confronts the dilemma of deciding to whom the publication shall be primarily directed. Three possible audiences, each with equally legitimate but differing interests and perspectives, readily suggest themselves: (1) representatives of the various government agencies under whose auspices the research was conducted; (2) professional historians and archaeologists, who will digest the new information and use it as the basis for future research; and (3) the general public, whose individual members may merely live in or near the area under investigation, may themselves practice amateur history or archaeology, or may, perhaps with their children, be simply following up their curiosity about "all that digging along the waterfront" or the "old ship buried in the mud."

Accordingly, **Behind the Seawall** has been designed to be both useful and appealing to as wide and diverse an audience as possible, including professional scholars and interested citizens. As such, the authors have eschewed presentation of the data in a strictly academic style and format in favor of a less formally written publication intended to be at once informative, lively, and easily understood. To help accomplish these aims, diverse graphic materials appear extensively throughout the volumes, footnotes have been eliminated from the chapters, and most highly detailed, purely technical data have been placed in the five appendices which comprise Volume 3 of this report. All sources of information used by the authors, however, are cited in the text, and a single, inclusive project bibliography appears at the conclusion of Volume 2.

Literally hundreds of individuals have contributed to this project since its inception in 1977. While space precludes specific mention of each of these people, the editor would like to acknowledge those who have been most closely associated with the project. Firstly, within the City and County of San Francisco, the Wastewater Management Program (the name of which was changed in 1980 to the Clean Water Program), and its designated contruction management firm, DeLeuw-Greeley-Hyman, thanks are offered to John Noonan, Linda Ferbert, Leo Jed, Barbara Sahm, Selina Bendix, Vitaly Troyan, Sam Liu, Blaise Cullen, Nancy Fong, Louise Stoll, Victoria Hopkins, George Klein, Sara Pickus, Malcolm Mooney, Leroy Davis, Jr., Harry Chinn, Hugh Havlik, and Diana Taylor. All extended themselves many times to help members of the archaeological team sort out the numerous administrative and logistical problems which inevitably arise during a project of this length and complexity. Joe Pope and Chris Chaloupka of the State Water Resources Control Board contributed invaluable counsel, as did William Seidel and Nick del Cioppo of the State Historic Preservation Office. James Delgado of the National Park Service and Garland Gordon, Holly Dunbar, and Marley Brown of the federal Interagency Archaeological Service provided helpful insights during the excavation and analysis of the King Street ship.

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The editor also wishes to thank the authors who labored so long to produce the chapters which make up the following report: Dr. Donna Garaventa, Dr. Robert Gross, Eric McGuire, Roger and Nancy Olmsted, Frank Sternad, and particularly Jack Prichett. Janice Narita Pastron, in addition to co-authoring one of the chapters in Volume 2, produced many of the graphics which appear in the report, and thanks are duly extended.

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In closing, special thanks are offered to Patrick S. Hallinan and to Richard Sklar, without whose help the project could not have begun. The same measure of appreciation is extended to Marilyn Ziebarth, whose skill, expertise, and pertinacity as manuscript and production editor as well as designer allowed the project to conclude.

Finally, this volume is respectfully dedicated to S. P.

CHAPTER 1

A VIEW FROM BEHIND THE SEAWALL

> It's an odd place: unlike any other place in creation, and so should it be; for it is not created in the ordinary way, but hatched like chickens by artificial heat.
>
> California Forty-niner (Lotchin 1974)

Introducing San Francisco's Historical Archaeology

San Francisco's historic waterfront has long been the heart of the city and the gateway to Northern California. For decades it was the biggest, bawdiest, and roughest port in the entire West, the home of the infamous Barbary Coast and, later, Harry Bridges' insurgent longshoremen's union. Year after year, the waterfront pumped prosperity and vitality into the city which flourished on the bounty carried by the ships streaming through the Golden Gate to tie up at the docks. As San Francisco's economy developed rapidly during the latter years of the nineteenth century, the waterfront expanded, too. As always, the city's health and welfare were inseparable from her docks.

Since 1849, when eager gold seekers created an "instant" city on the shoreline of San Francisco Bay, the waterfront has undergone continual metamorphosis. As speculators and developers quickly claimed the area's few flat and accessible plots of ground, they cast about for new ways to profit from booming land sales and commerce. With an audacity born of greed, or vision, the Yankee entrepreneurs developed the waterfront out into the mud flats of San Francisco Bay (see Figure 1.01). Beach and water lots (plots on city blocks scheduled for, but not yet created by, land filling) were sold and resold at escalating prices in the early 1850s;

abandoned Gold Rush ships were beached and pressed into service as warehouses, hotels, and offices along the rim of the lumber-poor town.

As the years passed, a bustling network of wharves and connecting cross-streets stretched further out into the bay, and rocks from the Telegraph Hill quarry, sand from the city's numerous dunes, and an abundance of cultural refuse were dumped into the bay as fill. The waterfront expanded to the east, and soon an apron of manmade land lay at the base of the city's hills. During the last decades of the nineteenth century, the placement of a massive seawall along the length of the waterfront gave shape to the modern city front (see Figure 1.02). Today, many of the glass and steel towers of the financial district as well as the commercial and industrial buildings to the south of Market Street stand upon this carpet of filled land.

Recently, construction required by the city's massive sewer expansion project cut a path through the landfill behind the city's wharves. The archaeological work described in **Behind the Seawall**, an essential part of the federally funded San Francisco Wastewater Management Program, was designed to protect significant cultural resources in the historic waterfront area from being adversely impacted or destroyed by the construction process. In addition to simple preservation, the archaeological research sought to increase San Francisco's knowledge about aspects of its rich and varied--but literally buried--past.

Historical archaeology in urban areas offers a relatively new method for investigating little-known aspects of eighteenth and nineteenth-century American culture and tradition. Across the nation, publicly-funded construction projects requiring cultural resource evaluation are enabling archaeologists and historians to acquire and disseminate information about aspects of American life and culture in the eighteenth and nineteenth centuries (see Figure 1.03). One such project, involving the construction of the MARTA rapid transit system in Atlanta, Georgia, resulted in a project of archaeological research similar to the Wastewater Management Program (Dickens and Bowen 1978). In an even broader undertaking, the municipality of Alexandria, Virginia, has prepared a comprehensive inventory of the city's archaeological resources (Cressy 1978).

Not surprisingly, archaeological research in urban areas often yields tantalizing results. During the course of the present work, for example,

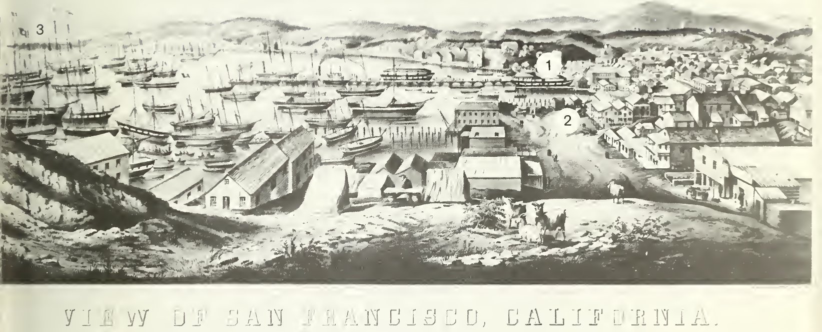

3
1
2
VIEW OF SAN FRANCISCO, CALIFORNIA.
M'MURTRIE,

Figure 1.01: Yerba Buena Cove in the 1850's. . .By the second year of the Gold Rush, San Franciscans were busily constructing wharves, building on water lots, and filling the bay. The rutted lane at right center is Sansome Street; the storeship **Niantic** (1) sits near Sansome and Clay. Pilings are in place for the new wharf at the foot of Pacific Street (2).

By the time of the completion of the great seawall in the early twentieth century, the entire cove had been fulled in. Today, the tip of Rincon Point (3) is buried, and the seawall lies near the left edge of the cove as shown in this lithograph. Excavation for the C-3 and N-3 sewer sections cut through the deep fill just inside the seawall. (Bancroft Library)

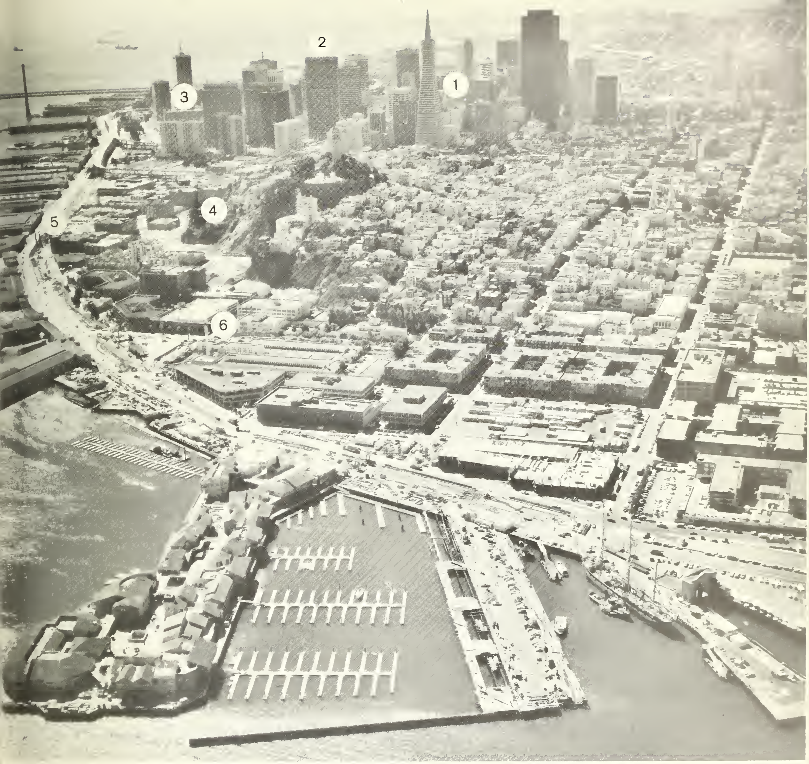


Figure 1.02: San Francisco from the Air, September, 1978. . .All of the downtown highrises to the east of the Transamerica Building (1), including the "Pyramid" itself, Embarcadero Center (2), and the Hyatt Regency Hotel (3), are built over the filled Yerba Buena Cove. Constructed along the seawall right-or-way, the Embarcadero marks the present city front. Telegraph Hill's jagged faces (4) mark its early contribution to the rock fill dumped in and behind the great seawall.

When this photograph was taken, excavation for N-3 was underway near Lombard Street (5). A tower crane and the round sewage treatment building mark the N-5 dump site at Kearny between Bay and North Point streets (6). Long stretches of the C-3 and N-3 alignments run along the Embarcadero immediately behind the seawall. (Pacific Aerial Surveys, Oakland)

an extensive sampling of Chinese ceramic ware was recovered from the site of the North Point Pump Station at the busy intersection of the Embarcadero, Kearny Street, and North Point Street. This unique collection of artifacts illuminates aspects of the daily lives of common people in nineteenth-century San Francisco's Chinese community which were rarely recorded in contemporary chronicles and standard history books. Another significant discovery during the project was a nineteenth-century wooden sailing vessel buried intact in landfill on King Street near the Embarcadero. Examination of this hulk not only links San Francisco's past and present but also helps local and maritime historians to understand the evolution of shipbuilding practices. Finally, the experience gained from the archaeological aspects of the San Francisco Wastewater Management Program provides theoretical and methodological insights that will benefit future historical archaeologists studying equally complex urban sites and assemblages.

Established as a formal academic discipline in the nineteenth century, archaeology gleans its insights into the human experience through a systematic study of the clutter of the past. With probing trowel, the archaeologist delves into the ashes of long extinguished fires, the debris scattered in the wake of forgotten battles, and the ruins of abandoned settlements, uncovering and studying the traces of past lifeways. With a unique "worm's eye view" of human history, he explores the remains left by humanity's preceding generations--the bones, bricks, and tools of total cultural systems wherein people were born, labored, celebrated, prayed, and eventually died. Just as the paleontologist reconstructs the appearance of a long vanished Brontosaurus from disarticulated bones, the archaeologist uses the scattered material traces of a culture to reconstruct a larger whole. For example, different sorts of pottery found within a site may bespeak the divergent origins of the makers or illustrate the varying social standing of the owners. The types of animal bones encountered by the archaeologist may tell not only what people had for dinner but how they cooked it and how much they ate.

To the American public, the idea of archaeology usually elicits images of romantic expeditions to distant, barren deserts where, amid hardship and privation, explorers unearth treasure-laden royal tombs or the bones of early ape-like ancestors. The notion of practicing archaeology in our own cities, of studying the remains of structures and activities covered over within the last two centuries, appears less important and certainly less exciting. Yet, by focusing attention on sites about to be destroyed by urban renewal or new construction, archaeologists are doing what they have always done--studying society's past through the scattered, buried remains it has left behind in order to learn broader truths about the human experience.

In making the move to study more recent cultural remains, archaeology has acquired a new subfield--historical archaeology. What this means is that, unlike the earth's countless generations of prehistoric peoples, our nearer forefathers bequeathed a written historic record of how they lived and why they did what they did. Archaeologists investigating a prehistoric site frequently know no more than the fact that stone flakes and tools indicate previous human use of the spot. Consequently, prehistoric archaeologists have developed a wide variety of sophisticated sampling strategies and research procedures to tap the unknown range of possibilities offered by a site. They try to sample the full range of tools that might have been used, to intersect house floors as well as open space between dwellings, and if possible, to locate areas where ceremonies were held and where the dead were interred. Prehistoric archaeologists must proceed on the assumption that most of the information to be obtained about the culture under investigation will be extracted from a systematic sampling of the site or from reviewing the literature describing previous archaeological fieldwork in the same locality.

By contrast, the historical archaeologist need not begin his research faced with such a vacuum of information. Maps from earlier periods reveal the location of houses no longer standing, street routes that have been changed, and often a succession of activities which may no longer be evident. This is frequently the case, for instance, when a new building's basement eradicates all traces of an earlier structure. The historical archaeologist often begins his excavation with a fairly accurate picture of the site he intends to investigate--a fort, a seventeenth-century Dutch household in the Hudson River Valley, or a former stagecoach stop and tavern. He may possess photographs or a drawing of the structure or may have spoken with the people who remember its appearance.

While prehistoric- and historic-period archaeologists start their work from different perspectives, particularly with regard to the amount of foreknowledge they possess about the sites they are investigating, at the same time they share many common points of interest which must not be overlooked. One of these is the nature of the artifacts and features dealt with by archaeologists. By definition, archaeologists study what is lost, destroyed, buried, or thrown away. There are few other ways in which objects become embedded within the evergrowing natural and cultural blanket of debris-littered soil. Many of the same processes that resulted in the formation of the Native American shellmounds which once surrounded San Francisco Bay may be observed in our cities today. Litter, in the words of the clean-up jingle, is not "put in its proper place" but is instead incorporated into the soil of our yards and parks. Archaeologists working a thousand years from now may speak eruditely of the "pop-top horizon," characterized by the sudden appearance in parks and campgrounds of millions of indestructible small aluminum slivers with attached rings.

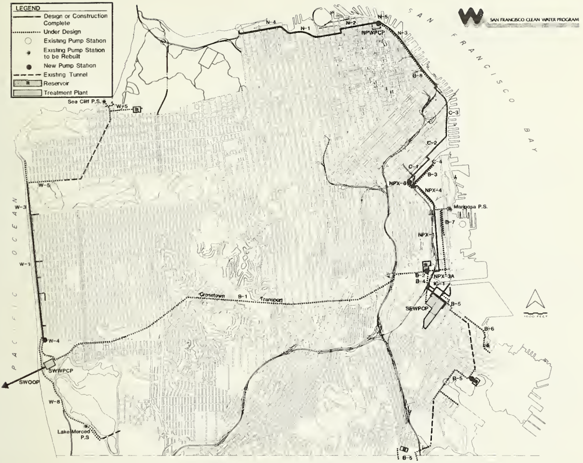
The study of refuse is nothing new to archaeologists. All societies produce waste products which need disposal in one way or another. In the past, the problem was simple. The Indians of the San Francisco Bay Area lived atop the accumulating pile of shells from the food they ate. The early Anglo-American settlers of Brunswick, North Carolina, simply dumped their trash baskets outside their front doors, a pattern so pronounced that the discovery of a trash pit indicates the presence of a nearby doorway (South 1977a:48).

As population densities grow, however, the problems of refuse disposal become more acute. By the time people inhabit multi-story apartment buildings and several thousand inhabitants crowd onto a single city block, refuse disposal by the older methods becomes impossible. New techniques must be developed in order to insure continuing health and comfort within a burgeoning urban center. Accordingly, individual handling of waste in a long established cultural manner gives way to more centralized and communal approaches such as nightsoil collection and the "town dump." Finally, highly sophisticated, publicly funded and administered programs of waste disposal develop, including scavenger services, modern sewage systems with sophisticated procedures for treating waste, and complex refuse handling facilities which recycle, incinerate and compost different sorts of rubbish.

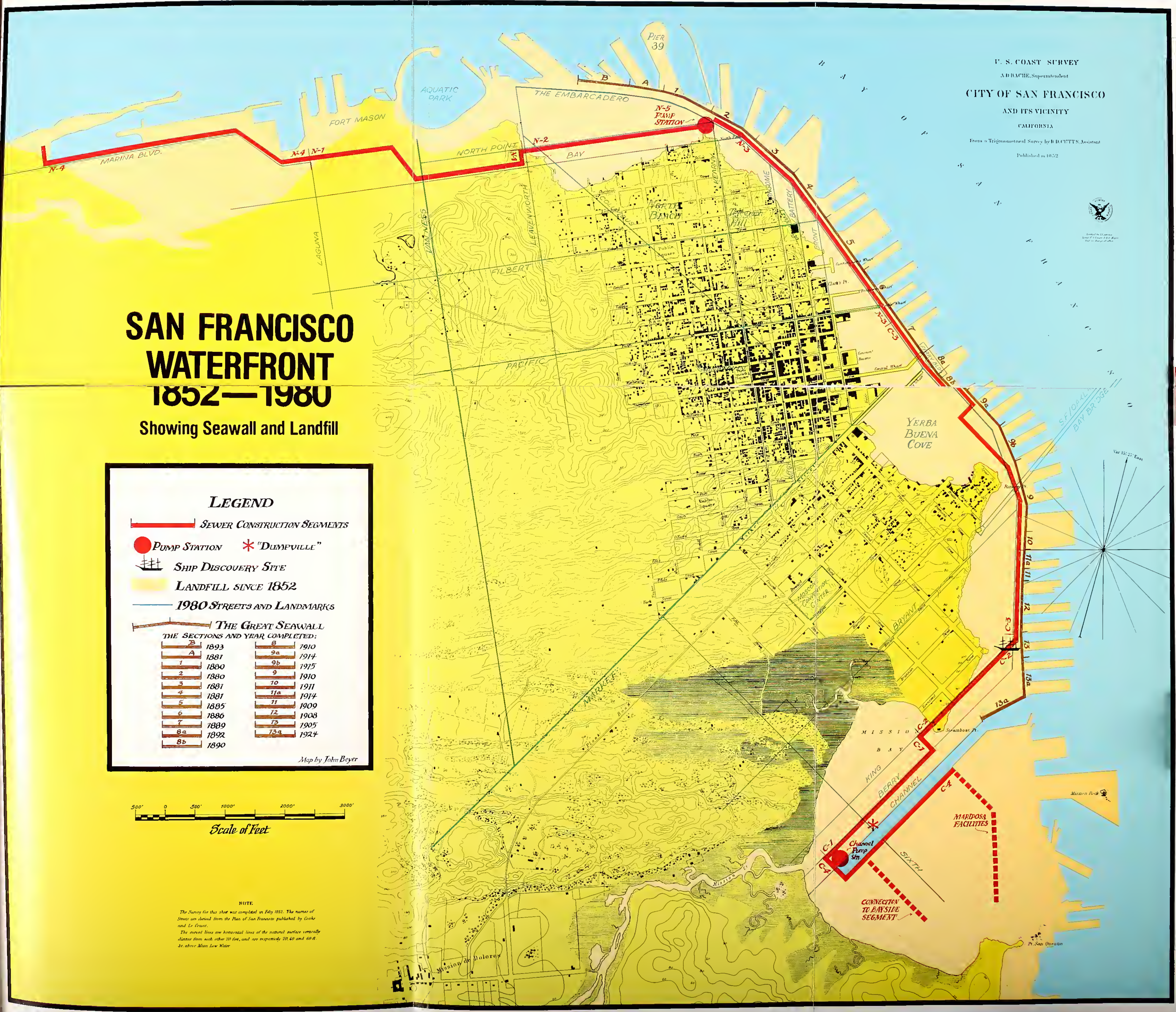
The new San Francisco Wastewater Management Program, a plan to upgrade the city's sewer system so that untreated wastewater will no longer be discharged into San Francisco Bay when rainwater fills the system to overflow capacity, exemplifies just such an artifice of a densely populated, technologically sophisticated urban society. By an odd juxtaposition of past and present, the construction of this waste treatment system has provided an opportunity for archaeologists to examine evidence about the city's past practices of refuse disposal. The story which emerges is told by the artifacts themselves as well as detailed study of historical sources which document San Francisco's rapid development during the second half of the nineteenth century.

Why do archaeologists concern themselves with life in San Francisco a scant century ago? One reason is the opportunity to learn about ourselves because the environment we inhabit today grew directly out of yesterday's experiences. Archaeological investigation can also shed light on particular past events for their own sake, adding to our storehouse of knowledge about the lifeways of our ancestors. More importantly, however, archaeological undertakings offer a way to learn about the growth of culture and the flow of human development. Without knowledge of how things came to be, we cannot comprehend the complex present, and we handicap our ability to design the future.

Essentially, all archaeologists and ethnohistorians look at three aspects of past human activity: (1) particular cultural events, forms of social organization, technologies, and lifeways now vanished or forgotten; (2) general laws governing the evolution of culture; and (3) social patterns observable in the archaeological and cultural record that continue to shape contemporary human societies. Now emerging, however, is a fourth aspect of concern for archaeologists and cultural resource managers. This is the use of archaeological and historical knowledge as a guide in the design and implementation of social and economic planning and the making of policy for the future. Without an archaeologically grounded perspective on human life which sheds light on the successes and failures of our predecessors, we are less able to make intelligent choices for planning and preservation.



Map 1.01: 1979 San Francisco Map. . . showing sewer alignments ringing and transversing the city. (WMP)



SAN FRANCISCO WATERFRONT 1852—1980

Showing Seawall and Landfill

LEGEND

- Sewer Construction Segments
- ● Pump Station
- * "Dumpville"
- Ship Discovery Site
- Landfill since 1852
- 1980 Streets and Landmarks
- The Great Seawall

THE SECTIONS AND YEAR COMPLETED:

Section	Year	Section	Year
B	1893	8	1910
A	1881	9a	1914
1	1880	9b	1915
2	1880	9	1910
3	1881	10	1911
4	1881	11a	1914
5	1885	11	1909
6	1886	12	1908
7	1889	13	1905
8a	1892	13a	1924
8b	1890		

Map by John Beyer

U. S. COAST SURVEY
A.D BACHE, Superintendent
CITY OF SAN FRANCISCO
AND ITS VICINITY
CALIFORNIA
From a Trigonometrical Survey by R D. CUTTS, Assistant
Published in 1852

NOTE

The Survey for this sheet was completed in Feby 1852. The names of Streets are derived from the Plan of San Francisco published by Cooke and Le Count.

The curved lines are horizontal lines of the natural surface vertically distant from each other 20 feet, and are respectively 20, 40 and 60 ft. &c. above Mean Low Water

STRUCTURING THE ARCHAEOLOGICAL PROGRAM

The San Francisco Wastewater Management Program was formed in response to the passage of the federal Water Pollution Control Act of 1972, Public Law 92-500, which mandated a massive cleanup by 1985 of the nation's navigable waterways. This legislation dictated an extensive overhaul of San Francisco's overburdened and outdated sewer system which routinely discharged tons of untreated waste into the waters of the bay when rainwater filled the sewers. To correct this situation and comply with Public Law 92-500, the City of San Francisco developed plans for a massive, city-wide sewer expansion and renovation program. The work would be financed primarily by the federal government through the Environmental Protection Agency (EPA); the remaining funds would come from the State of California through the State Water Resources Control Board and from the taxpayers of the City and County of San Francisco.

The scope of the San Francisco Wastewater Management Program calls for the construction or renovation of a number of sewage treatment and transport facilities throughout the city (see Map 1.01). Three of these facilities, the Channel and the North Shore Outfalls Consolidation projects and the North Point Pump Station, traverse several miles of San Francisco's waterfront between what was once Mission Bay and the intersection of Marina Boulevard and Baker Street near the Golden Gate Bridge (see Map 1.02).

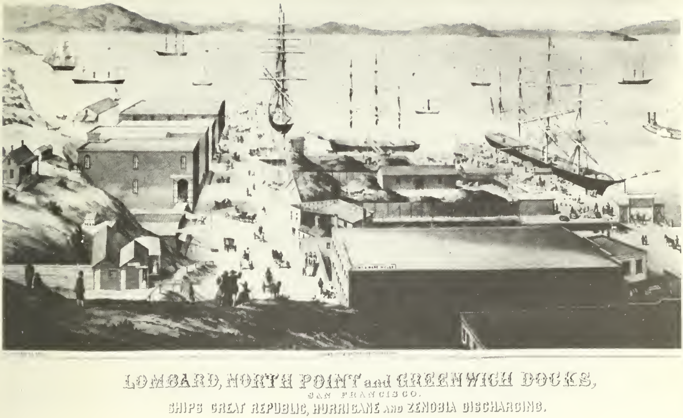
Work began on these facilities in June 1977. While archaeological and historical investigations have been conducted within other components of the Wastewater Management Program (Albee and Willer 1976; Chavez 1979; Chavez and Ramsey 1979; Olmsted and Olmsted 1979; Olmsted, Olmsted, Pastron and Prichett 1979), this report discusses only the archaeological resources contained within the Channel and North Shore outfalls and the North Point Pump Station.

At the core of the Channel and North Shore projects is construction of a massive concrete storm culvert to run along the waterfront beneath existing city streets (see Figure 1.04). This storm culvert will have the capacity to store large amounts of untreated sewage during rainy weather for processing at a later date. The North Point Pump Station at the intersection of North Point and Kearny streets will move wastewater through the system.

The Channel Outfalls Consolidation Project is composed of four separate contract alignments, or ground plans, which are contiguous except for the Channel Street Pump Station at Seventh Street between Berry and Channel streets, which joins the western ends of the C-1 and C-4 alignments ("C" stands for Channel). Within each of these four channel outfall alignments, a large open-cut excavation holds a concrete sewer box structure. The C-1 and C-4 alignments parallel each other along Berry and Channel streets respectively between Fourth and Seventh streets, both traversing what once was Mission Bay. C-2 runs along the south side of King Street between Fourth Street and the Embarcadero, and C-3 proceeds along the waterfront between King and Jackson streets.

The North Shore Outfalls Consolidation Project is composed of four contiguous contract alignments, excluding the North Point Pump Station (the N-5 contract area) which separates the N-3 and N-2 alignments near the intersection of the Embarcadero with Kearny and North Point streets. N-3, an open-cut excavation, runs along the Embarcadero between Jackson and North Point streets. N-2, which goes through North Beach along North Point Street between Kearny and Leavenworth streets, consists of a tunnel which runs beneath the level of the historic fill and occasional open-cut excavation. To the west, N-1 consists of another tunnel bored through rock and soft ground which runs beneath Bay Street and under Fort Mason. Open-cut excavation in the N-1 area occurs only at the extreme western and eastern ends of the tunnel. N-4, running through the modern Marina District along Marina Boulevard between Laguna and Baker streets, consists entirely of open-cut excavation.

Archaeological investigation and analysis focused heavily on two special sites: the N-5 North Point Pump Station and the C-2 alignment on King Street. The N-5 site contained an extensive trash dump dating to the early 1880s which yielded significant numbers of artifacts manufactured in China. Unexpectedly, C-2 revealed the wooden hulk of a nineteenth-century ship during the course of routine construction monitoring. Because


LOMBARD, NORTH POINT and GREENWICH DOCKS,
SAN FRANCISCO.
SHIPS GREAT REPUBLIC, HURRICANE AND ZENOBIA DISCHARGING.

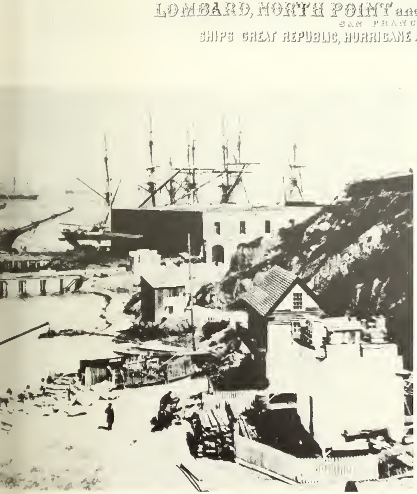


Figure 1.06: Looking Down Sansome Street in 1857. . .This view, a companion to Figure 1.05, shows "warehouse row" along the foot of Sansome Street, which ends in the Lombard Dock. The impressive display offered by the giant clippers may have been the occasion prompting artist C. B. Gifford to paint the scene (which was lithographed by H. Eastman and A. Nahl). North Point, the N-5 site, lies at the foot of Telegraph Hill near the left edge of the illustration. The outer edge of the great seawall built in 1881 fell just beyond the end of the Lombard Dock. (Bancroft Library, University of California, Berkeley)

Figure 1.05: The North Waterfront c. 1864. . .Dominating this scene are the North Point Warehouse and the foot of the Lombard Street Dock. The warehouse fronted (side away from camera) on Sansome; the two small houses in the foreground lie approximately on the line of Montgomery Street at Chestnut. Between the 1860s and 1880-81, when Sections 1, 2, and 3 of the seawall were constructed, this area of the waterfront developed slowly. Construction of the seawall cut across the Lombard Dock, and filling behind it covered much of what is visible in this scene. (California Historical Society)

these sites proved to be the most unique and significant, they are discussed at considerable length in the following pages.

Details on the routes and dimensions of all the contract areas within the Channel and North Shore Outfalls Consolidation projects appear in the December 1977 report entitled **San Francisco Waterfront: Report on Historical Cultural Resources** by Roger Olmsted, Nancy Olmsted, and Allen Pastron (hereinafter abbreviated as **San Francisco Waterfront.** Repositories of this first printing include the Bancroft Library, University of California, Berkeley; the San Francisco History Room of the San Francisco Public Library; and the Regional Office of the California Archaeological Site Survey, Cabrillo College, Aptos. In 1981, the volume was reprinted for additional circulation).

ESTABLISHING THE PROJECT'S SCOPE

The scope of services and research parameters of the Wastewater Management Program's archaeological investigation evolved slowly and at times haltingly during 1976 and the first half of 1977. Individuals with differing professional perspectives and institutional affiliations contributed to the shape of the historical and archaeological research ultimately implemented within the confines of the Channel and North Shore outfalls. While the main concern of this report is with the results rather than the development of the Wastewater Management archaeological program, some background information will illuminate the context in which the research was formulated and conducted.

From the beginning, it was evident that some program of historical and archaeological inquiry would be a required component of the Wastewater Management Program's overall mandate. Since the program was federally financed, Public Law 93-291 (the Archaeological and Historic Preservation Act of 1974) required that systematic efforts be made to locate and identify cultural resources of potential significance within the confines of the various project areas which might suffer adverse impact as a result of the planned construction. Once identified, an adequate plan for the mitigation of adverse impact to such cultural properties of significance would, by law, have to be incorporated into the overall matrix of contract specifications. Public Law 93-291 also contained provisions for the funding of historic and archaeological research in connection with federally sponsored construction projects, the legislation declaring that as much as 1 percent of the total project costs could be budgeted for archaeological and historic research. Since San Francisco's sewer expansion program was projected in 1976 to cost approximately $1.5 billion, the Wastewater Management Program represented a unique reservoir of potential research funds.

Of the many projected sewer routes in the Wastewater Program, none was more interesting to archaeologists and historians than the alignments of the Channel and North Shore outfalls, several of which cut directly through the heart of the nineteenth-century waterfront. The opportunity to locate, identify, study, and perhaps restore and preserve intact structures and artifacts dating from San Francisco's Gold Rush era presented tantalizing possibilities to local historians and archaeologists.

Because San Francisco's Wastewater Management Program involved federal and state funds, representatives of several governmental agencies concerned with cultural resources became involved in guiding the City and County of San Francisco in complying with the provisions of Public Law 93-291. These federal agencies included the Advisory Council on Historic Preservation, the Western Regional Office of the National Park Service, and the Office of Archaeology and Historic Preservation. At the state level, the California Office of Historic Preservation and the State Water Resources Control Board were involved.

Throughout 1976 and 1977, a number of private consultants and agency representatives attempted to formulate an appropriate program of historical and archaeological research for the waterfront. Frequent meetings focused on the potential for finding significant cultural resources within the Channel and North Shore outfalls, and a number of reports and memoranda offered preliminary assessments and recommendations for locating and identifying these cultural remains (Ayres and Stone 1972; Gordon 1976; Hallinan and Pastron 1976; Olmsted 1977a, 1977b; Olmsted, Olmsted and Pastron 1977; Peak et al. 1976). Differing widely in their conclusions and recommendations, these reports made it apparent that no quick or general consensus would be forthcoming from the archaeological community regarding the appropriate nature of the investigative procedures to locate, identify, and assess the cultural resources. One set of consultants, for example, concluded that no cultural resources of significance were likely to be encountered within the North Shore or Channel outfalls because the various sewer alignments would pass almost entirely through landfill; consequently no program of preconstruction archaeological testing was deemed necessary. Conversely, another group of archaeological consultants came to the opposing view that the preliminary evidence concerning the cultural resources of the San Francisco waterfront was promising enough to justify an extensive program of archaeological and historical investigation tentatively budgeted at over $2 million.

So that the absence of an accepted archaeological plan would not delay sewer project construction scheduled to begin in mid-1977 within the Channel and North Shore outfalls, the Environmental Protection Agency (EPA) drew up a Memorandum of Agreement representing the input of the participating regulatory and advisory agencies: the EPA, the Advisory Council on Historic Preservation, the Western Regional Office of the National Park Service, the Office of Archaeology and Historic Preservation of the National Park Service, Washington, D.C., the State Office of Historic Preservation, the State Water Resources Control Board, and the City and County of San Francisco. This Memorandum of Agreement outlined two goals for further talks:

(1) to discuss the possible effects of the overall San Francisco Wastewater Project on cultural resources included in or eligible for inclusion in the National Register of Historic Places; and

(2) to develop specific measures to avoid or satisfactorily mitigate any adverse effect on such cultural resources as a result of the C-1 and C-4 phases, which are scheduled for immediate construction starts (EPA 1977).

The vague language surrounding the program's general goals reflects the lack of a satisfactory comprehensive research design for archaeological work upon the eve of the commencement of construction. On the other hand, the accepted scope of archaeological work for the C-1 and C-4 areas precisely detailed a range of investigative and precautionary procedures. As described in the EPA Memorandum (discussed in Chapter 2), the salient features of the archaeological program for the C-1 and C-4 areas consisted of the systematic placement of mechanical exploratory borings within the two project areas, as well as the initiation of interim monitoring of excavation to detect the presence of archaeological resources which might be eligible for inclusion in the National Register of Historic Places.

Following the appearance of the EPA Memorandum, Dr. Allen G. Pastron was retained by the City and County of San Francisco to direct the archaeological research program within the Channel and North Shore outfalls. Henceforth in this report, Dr. Pastron is referred to as the Principal Investigator.

Construction within the C-1 alignment commenced in June 1977. Archaeological testing and interim monitoring of construction activities began at the same time. Thereafter, such research activities were undertaken within all of the contract segments of the Channel and North Shore outfalls, either prior to or in conjunction with the advent of construction.

A report which described and interpreted the findings of the preconstruction archaeological testing program and which offered recommendations for further archaeological procedures within the C-1 and C-4 areas was submitted to the Wastewater Management Program in July 1977. (By this time, mass excavation was well underway in C-1 and about to commence in C-4). The report (Pastron 1977a) recommended that limited interim monitoring of construction activity be continued for the duration of excavation activities within C-1 and C-4. No other archaeological measures designed to mitigate adverse impact to cultural resources potentially eligible for the National Register were recommended, since no qualifying archaeological materials had been encountered during the preconstruction archaeological testing program.

During the remaining months of 1977, archaeological and historical testing proceeded within the remaining areas of the Channel and North Shore outfalls in accordance with the provisions of the EPA Memorandum regarding C-1 and C-4. Throughout 1978 and the first half of 1979, archaeological monitoring and data collection in the areas resulted in the recovery of a large quantity of nineteenth-century cultural material from the waterfront landfill.

A concurrent program of archaeological and historical inquiry was conducted at another of the Wastewater Management Program's contract areas, the Southeast Water Pollution Control Plant in the Bayview district of San Francisco. The results of this research will soon appear in **Rincon de Las Salinas y Potrero Viejo, the Vanished Corner: Historical Archaeological Program at the Southeast Treatment Plant** by Roger Olmsted, Nancy Olmsted, Allen Pastron, and Jack Prichett (In Press).

AGREEING ON DEFINITIONS OF SIGNIFICANCE

The single most serious obstacle to the timely formulation of a master plan for cultural resources evaluation and management within the Wastewater Management Program was the lack of consensus among archaeologists regarding which types of cultural materials were significant and which were not. While "significance" has come to be a commonly employed word in the lexicon of contemporary American archaeologists and represents one of the key concepts guiding the actions of agencies and consultants concerned with cultural resources management, perspectives on the precise connotations and implications of the term diverge widely.

Within the context of publicly funded archaeological programs, a site or other cultural resource is considered significant if it is potentially eligible for inclusion in the National Register of Historic Places. To qualify, an archaeological site or resource must "have yielded, or may be likely to yield, information important in prehistory or history" (Advisory Council on Historic Preservation 1974). These criteria for determination of significance are broad enough to include a wide range of structures, sites, networks (such as canals and roadways), and artifacts (such as railroad engines, ships, and statues). Thus, the National Register now includes historic resources in California as diverse as the town of Mendocino and the Farallone Islands, the Governor's Mansion and the Manzanar War Relocation Center, as well as military forts and mining districts. As observed in an earlier resources report, "Given the relative newness of the regulations, the broad, inclusive quality of the National Register criteria probably best fulfills the intent of the law which is to protect cultural resources" (Olmsted, Olmsted, Pastron and Prichett 1979:235). Furthermore, National Register guidelines advantageously permit the establishment of local and regional standards of significance without the encumbrance of a formal, restrictive, and possibly inappropriate national code. On the other hand, these broad criteria allow wide latitude for individual judgment and interpretation, sometimes resulting in endless tautological debates between archaeologists of dissimilar viewpoints. When this happens, the process of determining significance becomes painfully cumbersome.

During the past decade, a number of archaeologists and cultural resource managers have addressed the issue of significance. In the opinion of some scholars, the broad guidelines of the National Register should be followed implicitly. For example, Moratto, in a frequently cited paper entitled "On the Concept of Archaeological Significance, " stated in 1975 that he would

> define "significant" cultural data (including both historic and prehistoric material) to include any sites, specimens, artifacts, remains and records pertaining thereto, which have value as sources of information regarding the cultural past, or which have religious or other special importance to a specific ethnic community. . . .Every archaeological site is significant and deserving of responsible, enlightened management.

Others have instead identified various components of significance to help evaluate cultural resources. Glassow, in a thoughtful treatment of the issue, notes five distinct criteria--variety, quantity, clarity, integrity, and environmental context (1977:413-419). Still other writers would assess cultural resources from a number of differing perspectives, historical, scientific, ethnic, legal, public, and monetary being most common (Scoville, Gordon and Anderson 1972; Moratto and Kelly 1976; Schiffer and House 1977; Schiffer and Gummerman 1977; Wirth Associates 1979a).

From the outset of San Francisco's Wastewater Management Program, individuals concerned with archaeological and historical inquiries agreed that a wide range of artifacts and structural remains would be encountered within the Channel and North Shore outfalls. Short of halting construction for every cultural specimen unearthed by the backhoe or, conversely, of deciding in advance to proceed to the conclusion of the project without pause, regardless of the types of artifacts or structures encountered, the Principal Investigator, in association with the concerned governmental agencies, recognized the need to establish clear standards of significance as soon as possible.

Without difficulty, everyone agreed that any cultural resources from the prehistoric, Spanish, Mexican, Early American, and Gold Rush periods (2000 BC - 1857 AD) would be deemed of intrinsic significance. However, because the projected sewer routes along the waterfront crossed the original shoreline of San Francisco Bay in only five places, and ran mostly through landfill deposited in a later period, there seemed little chance of encountering cultural resources from any of these earliest chronological periods.

It was also agreed that the remains of any nineteenth-century wooden sailing vessels would be considered eligible for inclusion in the National Register, most importantly from the standpoints of historical and public or social significance as defined by Scoville, Gordon and Anderson (1972:13) and Schiffer and House (1977:46). Although none of a number of Gold Rush ships known to be buried in the fill along the waterfront in the 1850s could be definitely identified as lying in the path of the oncoming sewer system, the chance of encountering an unknown vessel could not be ruled out. This possibility became a primary motivation for the extended archaeological monitoring of excavation within the Channel and North Shore outfalls.

According to early archival research, the bulk of the artifactual materials existing within the Channel and North Shore outfalls would be a wide variety of household and commercial refuse that had been deposited with fill behind San Francisco's seawall between approximately 1880 and 1915. Evaluating this type of archaeological material for potential significance proved more difficult than assessing ships, shellmounds, or adobes. Did a late nineteenth century American deposit of trash spanning two decades possess any of Glassow's defining criteria of significance? Were these materials of value from the standpoints of scientific, public, or historical significance? Antique glass bottles found intact would, for example, have monetary significance and might be suitable for display, yet substantial numbers already exist in pristine condition in the area's museums, antique shops, and private collections. In the words of one observer, "It would be idle to spend thousands of dollars digging up something that can be purchased for a fraction of the cost on Union Street" (Olmsted 1976:5). On the other hand, serious and well-funded projects of archaeological research have been conducted on historic and even contemporary refuse dumps in other parts of the country (Rathje 1974, 1976).

Historic wharves, piers, and pilings constituted another class of artifacts certain to be encountered along the San Francisco waterfront.

Like the refuse-laden fill, these structures needed to be evaluated in accordance with the much-discussed criteria of significance and potential eligibility for inclusion in the National Register.

After beginning preconstruction archaeological testing and interim monitoring within the Channel and North Shore outfalls, the project's Principal Archaeological Investigator consulted with a number of colleagues and decided that nineteenth-century trash deposits and historic wharves, piers, and pilings would not of themselves be considered significant according to the National Register criteria. None of these resources are unique or even rare, and it seemed that little scientific, historical, or public benefit could be derived from their systematic study and preservation. Accordingly, when two mechanical test borings revealed the presence of extensive trash deposits at the North Point (N-5) Pump Station dating to the early 1880s, nomination for the National Register was not seriously considered. However, once the artifacts were washed, sorted, and identified, the Principal Investigator noted that a sizable portion of these materials were manufactured in China. This fact upgraded the potential value of the site in a variety of ways: since little archaeological data have been accumulated concerning the Chinese experience in nineteenth century San Francisco, the site gained possible significance from an historical perspective because it had "potential for identification and reconstruction of specific cultures, periods, lifeways and events" (Scoville, Gordon and Anderson 1972:13). The site also promised potential ethnic significance. On the other hand, because the artifacts were found in landfill and because the fill was deposited in a brief span of time, it appeared unlikely that significant data could be gleaned from a systematic investigation of the spatial and contextual relationships between the excavated objects. Added to the fact that construction excavation had already begun and would be costly to halt, the Principal Investigator decided to recommend against the implementation of a program of controlled excavation and study at N-5 dump site.

A year later, however, when it seemed that a similar deposit of Chinese materials from the 1880s had been located at a spot which would be subjected to open-cut excavation within the adjacent N-2 alignment, the Principal Investigator did propose a program of systematic excavation to mitigate adverse impact to archaeological resources. The reasons for this change of direction were threefold: (1) as a result of the monitoring program within the N-5 area during the previous year, the Principal Investigator observed the composition of refuse dumped along the San Francisco waterfront and determined that systematic excavation and sampling might produce more useful contextual data than originally seemed possible; (2) the variety of Chinese artifacts within the N-5 dump site had not been evident in the test borings, but had become clear during monitoring of the site; (3) the work at N-2 could be conducted before beginning construction, alleviating the practical difficulties accompanying scientific research under the hovering bulldozer blade.

In the end, additional test borings at the eastern end of N-2, placed over the exact location of the small open-cut area, showed that only sterile sand fill lay below the surface at that spot, even though heavy trash deposits lay just to the west. Since no cultural resources would be impacted, the proposed systematic archaeological excavation was not carried out. Nonetheless, the N-2 and N-5 trash deposit examples suggest that evaluation of the significance of cultural resources is a continually evolving process, subject to wide-ranging variables which constantly alter the scientific and historic bases for assessing the importance of any given site or find. One recent work notes that "there can be no universal or absolute measure of worth for judging cultural materials. With the ongoing evolution of archaeological methods and theories, new concepts for the evaluation of cultural resources will continue to arise. New data can be extracted from previously studied resources" (Wirth Associates 1979a:7).

For the urban archaeologist, the challenges associated with attempting to evaluate the significance of resources are summed up in the following statement from another recent Wastewater Management Program report:

> When "significance" must often depend upon the cogency of a specific and perhaps novel argument (significant relative to what), and must usually be modified by "potential", and when potential contains a particularly high degree of physical uncertainty deriving from the limited experience base alone, it is clear that concise definitions are apt to be no more than general directions. But if definitions are imprecise and decisions regarding site-specific management of historical cultural resources tend toward one-at-a-time and often one-of-a-kind responses, then it is still true that perhaps the

> most important practical consequence of the pertinent laws and regulations will have been achieved: we are required to consider thoughtfully the potential for cultural resources, to attempt to adduce the potential significance of such resources as may exist, and to make comprehensible proposals for the protection of such resources, mitigation of damage to them, or (as is frequently the case in archaeology) recover useful information from the controlled disturbance of these resources (Olmsted, Olmsted, Pastron and Prichett, In Press).

Broad as the criteria for the inclusion of archaeological resources within the National Register may be and inconvenient as it is that "comprehensive definitions of significance cannot be plucked from regulatory pigeonholes to permit swift and agreeable determinations to be made" (Ibid.:239), the regulations do ultimately provide important and effective safeguards for the protection and systematic assessment of cultural resources. Legislation aimed at preserving historic and archaeological properties has made it possible to establish procedures whereby concerned citizens or government agency representatives can at least temporarily halt activities which threaten cultural materials of potential value while serious attention is given to their evaluation, study, and possible preservation. As will be seen in Chapter 4, this is precisely what occurred when the hulk of a nineteenth-century ship was discovered during the course of construction monitoring within the C-2 alignment on King Street.

Use of the National Register of Historic Places as a measure of significance permits the establishment of precedents and experiential standards for evaluating cultural resources. Each individual determination of eligibility increases our ability to cogently and swiftly evaluate similar resources in the future. The participants in the San Francisco Wastewater Management archaeological program hope that their experiences and findings will help clarify some issues relating to the potential significance of urban landfill as well as assist other historical archaeologists in evaluating and interpreting their materials.

ESTABLISHING ARCHAEOLOGICAL RESEARCH GOALS

Two principal considerations circumscribed the research parameters of the Wastewater Management archaeological program. The first was the formal restriction of archaeological inquiry to an area 50 feet on each side of the sewer alignments. This severely narrowed the questions which could be investigated and the sampling strategies which could be feasibly applied. Most sewer alignments within the Channel and North Shore outfalls were placed along well-established streets immediately behind the seawall which marks the city front. This placement meant that the majority of the alignments passed almost entirely through landfill. As well, it meant that no architectural features other than wharves would probably be encountered, except where an alignment happened to cross a property line into the interior of a block (as was the case with the N-5 pump station).

A second primary consideration which shaped the course of the archaeological research was the necessity of designing a program which could be conducted concurrently with sewer construction. In practical terms, this resulted in archaeological monitoring of excavation activities rather than extensive and controlled excavation.

The intellectual goals of the Wastewater Management archaeological program must be viewed in the context of ongoing research and theory within the field of historical archaeology. At present, historical archaeology finds itself in a state of considerable ferment resulting in part from the profound impact upon research of large-scale, publicly funded archaeological programs. These projects, of which the Wastewater Management archaeological program is a salient example, have resulted from the passage of such legislation as the National Historic Preservation Act of 1966, the National Environmental Protection Act of 1969, California's Environmental Quality Act of 1970, and the Archaeological and Historic Preservation Act of 1974.

Historical archaeology, as the name itself suggests, is a hybrid discipline, and a debate is being waged within the field between those who stress the historical and reconstruction goals of archaeological investigation and those who see it centering instead on scientific testing of hypotheses framed in a larger context of cultural and social evolution. Through a series of publications dating back to the 1950s, Stanley South has emerged as a primary spokesman for the scientific approach. Working with a number of colleagues and students, South has outlined a theoretical basis for applying the principal of the statistically oriented "new archaeology" of prehistoric research to the newer sub-field of historical archaeology (South 1955, 1968, 1977a, 1977b; Salwen 1973; Binford 1962, 1972a; Watson et al. 1971; Schiffer 1977). In contrast to South and his associates stand such scholars as Clyde Dollar (1968), Ivor Noël Hume (1969, 1970, 1974), and Iain Walker (1967), whose work places historical archaeology well within the tradition of historical, rather than anthropological, studies. In the historical approach, specific persons or events form the focus of research, rather than the larger abstract process of cultural change. According to Dollar, "The anthropologist deals with 'people' and the historical archaeologist deals with a person or persons" (1968:11). The theoretical differences between the two schools are important here, since many of the research results from the Wastewater Management archaeological program fall squarely into the historical, rather than the evolutionary-anthropological, model. This is in part the result of the narrowed parameters of the archaeological program outlined above.

A look at the central arguments of the "historical" and "scientific" schools of historical archaeology offers some light on the issues. In criticizing the "historical" approach, South wrote:

> Particularistic archaeology (pertaining to one person, thing, group, class, event, etc. . . . (special not general) emphasizes the individualistic analysis and synthesis. The paradigm (idea set) is ideographic (intensive study of an individual case) and particularistic (often characterized by an antinomothetic stance against the search for general laws). Archaeologists operating under a particularistic approach are often implicitly scientific, using principles of rigor in collecting field data, analyzing, and forming generalized conclusions from empirical data, while at the same time disdaining the use of the hypothetical-deductive method (reasoning from the general to the particular through hypothesis testing) and the scientific search for general laws (nomothetics) (1977: 8).

"Scientific" archaeologicists make a number of specific criticisms of the historical-particularist approach. One of these is overreliance on the use of evidence from written documents to the exclusion of purely archaeological data. Inaccurate maps and written accounts may mislead the historical archaeologist who accepts them uncritically. For example, archaeological investigations on the site to be occupied by the George R. Moscone Convention Center in San Francisco uncovered the remains of a building near the corner of Third and Folsom streets which apparently was erected after the 1859 Coast Survey mapping, but demolished before publication of the 1886 Sanborn Insurance Company mapping. As a cartographically "invisible" building, no amount of map research could have predicted its presence.

In the scientific study of artifacts, as well, a strictly historical study can go only so far. "There is no reason to believe," writes South in criticizing Ivor Noël Hume's work, **A Guide to Artifacts of Colonial America,** "that a taxonomy employed in England two hundred years ago would necessarily serve scientific needs today" (1977a: 12). Scientists often utilize concepts and classifications in their work which are completely independent of those used by the subjects of their study. For example, archaeologists studying at the now famous Koster site in Illinois found that mussel shells from Level 8 (dated 6000 years before the present) had a far higher strontium content than those from Level 6 (dated 4500 years before the present). This finding indicates climatic changes which brought more rainfall to the area and gave later villagers a different environment with a changed diet from their forebears (Streuver 1980: 110). The point to be made is that while the amount of strontium in the mussel shells is hardly a characteristic of which the American Indians were aware, much less had a name for, it is a scientific characteristic of great value in understanding the site.

Likewise, the historical archaeologist searching for understanding of various artifact classes may often find that the terminology originally applied to particular classes is irrelevant to his research purposes. Sophisticated chemical studies of glass and ceramics, for example, may in years to come provide us with significant understanding of historical artifacts and, like the mussel shells, be quite unrelated to the terms employed by the people who used them.

The result of overusing historical data, according to South, is "a clotheshorse of history . . . draped with bits and pieces of archaeological data" (1977a: 23). The site report written in this manner, he continues, has "become a standard format in the examination of historic sites by archeologists, and it is circular in that archaeological data are merely used to reinforce written records by providing a few missing details of artifacts or architecture" (Ibid.).

This emphasis on identification by consultation with written documents, according to South, "contrasts markedly with attempts to use archaeological data for evaluating ideas about cultural processes and with a goal of the specification of 'laws' of such processes and the explanation for why such patterned regularity exists" (Ibid.:10). Strictly "historical" principles of classification suffer in at least two respects, he continues. One is the frequent lack of quantified, or quantifiable, archaeological data which handicaps researchers looking for statistical frequencies and figures. The second shortcoming is the idiosyncratic nature of the way in which groups of archaeological materials are described. Citing Flannery, South remarks that "archaeological data collected particularistically have a very limited value when used by another archaeologist operating under a different framework" (1977a:11).

In recent years, the need for placing collected data into a larger context has resulted in the use of regional surveys and models for archaeological investigation. Accordingly, the American frontier, for example, may be defined as a regional type of socio-ecological territory. Combining sparse settler population with highly specific forms of resource development, the frontier nurtured settlements such as mining camps and cow towns, classifications which historical archaeologists are beginning to use for comparing sites within regions (Hardesty 1980; Lewis 1977). While regional patterns for the western United States have yet to be fully defined, one could no doubt correctly cite the gold and silver booms as economic events which led to a influx of young single men. As a result, the boarding house developed as a common residential institution, and its remains are likely to be encountered archaeologically throughout the region.

Rather than be swallowed by a mass of individual artifacts, then, the goal of archaeological research should be problem-oriented, as opposed to strictly descriptive or exclusive to each site. Binford stated the case strongly when he urged that "historic-sites archaeologists should actively engage in nomothetic (theory-building) studies aimed at the specification of general propositions amenable to testing regarding (a) the processes responsible for the formation of the archaeological record and (b) the processes responsible for change and diversification in human lifeways" (1972:123).

Ideally, then, the Wastewater Management Program might have provided an area for implementing a "scientific" archaeological program of the sort favored by South and his colleagues. Such a program would be characterized by a precise research design which blocked out specific theoretical and methodological hypotheses to be tested, with the overall project area being large and diverse enough to reflect nineteenth-century San Francisco's rich and varied traditions. Methodologically precise research would investigate, for example, the archaeological manifestations of the city's ethnic composition, including its Asian, Latin, Irish, and Italian communities, as well as its economic and occupational diversity, including the heights of Nob Hill and the depths of Tar Flat.

As Parker wrote long ago, "The older emphasis of gathering great quantities of archaeological material for its own sake has given way to selecting archaeological sites as specific problems. . . . Only by pursuing the latter method may archaeology be built up as a deductive science" (1935:2-3). For many contemporary historical archaeologists, this means that a proper scientifically oriented project needs sites which offer specific kinds of variation and appropriate sampling strategies to extract their information. Archaeological manifestions of cultural variation within an urban setting include chronology, ethnicity, economic and social status, and technology.

Binford has suggested that archaeologists need to collect data in such a way that significant differences between sites or regional patterns will stand out clearly. South, for example, examined five towns in North and South Carolina dating from the late eighteenth century. The preponderance of kitchen artifacts over architectural artifacts at all five sites suggested a settled, domestic way of life which South has labeled the "Carolina Pattern" (1977a:107). By contrast, digging at more isolated outposts yielded many more architectural items such as window glass, nails, hardware, and lock parts, a "Frontier Pattern" suggesting a more rugged way of life centered on building, defense, and hunting.

Unfortunately, the scope of the Wastewater Management Program did not easily accommodate such a program of scientifically oriented archaeological inquiry along the San Francisco waterfront. Investigation of the archaeological manifestations of cultural variability along dimensions which could selectively be sampled was largely precluded by the fact that the alignments of the Channel and North Shore outfalls had been routed almost exclusively through landfill. While variation within this environment exists in the sorts of artifact classes dumped into the fill, the highly specific stratifying of sampling according to specific variables such as those employed by Otto in his study of the status differences in an antebellum plantation was certainly not possible (Otto 1977).

The landfill deposits of the San Francisco waterfront offered little chronological latitude. Filling behind the seawall along the North Shore segments was generally completed within the 20-year timespan between the late 1870s and early twentieth century; the majority of the filling behind the seawall within the Channel Outfalls took place between approximately 1900 and 1915. Hence, variation in the artifactual content of the fill between the North Shore and Channel segments might be anticipated, but within the boundaries of any given alignment, the time involved in the deposition of the original behind-the-seawall fill generally did not exceed 10 years. For all intents and purposes, this meant that samples from original seawall fill could be considered as nearly synchronic in nature. (This property of the original fill is analyzed in Chapter 5 which treats the N-5 contract area.) The synchronicity of the deposition therefore served as a constant against which to measure chronological variability, for example, in the samples of ceramic dolls and soda water bottles observed.

Additional factors which made it difficult to execute a properly "scientific" research design included the lack of precise control over the means of artifact collection. Monitoring allowed archaeologists to assign a horizontal level to the artifacts recovered along the course of an alignment, but the gathering of precise data about vertical position was another matter. Safety restrictions prevented monitors from descending into the sewer trenches without prior and explicit consultation with the resident engineer, and the use of bulldozers and backhoes for mass excavation made it very difficult to ascertain the precise depth or stratigraphic context from which an artifact had been removed or its association to architectural and structural features. The fact that artifacts were carried in the fill to the site from a large number of possible sources further complicated interpretation. (Some of these problems will be discussed further in Chapter 2.)

In short, Salwen's theoretical observations read as an accurate description of the San Francisco Wastewater Management Program:

> Almost all of the recent archaeological activity in the Northeast has been initiated primarily for non-archaeological purposes--usually as survey or salvage in connection with construction projects. This has meant that fieldwork, even if well planned and conducted, often fails to provide the kinds of samples needed to solve problems relating to socio-cultural processes. While this work may provide insights into history, or even culture-history, the project often ends at the very point where the archaeologist has learned enough to begin problem-oriented data collection (1978:15).

If unduly pessimistic, Salwen identifies two cogent realities of urban historical archaeology in the United States. The first is that agency-sponsored investigations have their own needs, which are not necessarily congruent with those of purely "scientific" research. (South, too, elaborates on this point (1977a:17-25).)

Salwen also, however, points out several failings in the present status of historical archaeology as a "scientific" discipline. One is the lack of a sufficient data base from which to begin formulating the hypotheses and laws which South advocates. Archaeologically excavated collections of nineteenth- and twentieth-century Chinese ceramic food ware such as described in Chapter 9, for example, now number no more than 15 (Chace 1976; Olsen 1978; Praetzellis et al. 1979a, 1979b; Evans 1980; Gehr 1975; Greenwood 1978, 1980), and most descriptions are as yet unpublished manuscripts. Glass bottles from the nineteenth century suffer the same problem.

The situation is similar for the corpus of reports treating post-Gold Rush historical sites in the West. Only a few dozen have been published, ranging from Greenwood's extensive look at a city block of Ventura, California (1975, 1976) and Fontana's exhaustive catalogue description of artifacts found at the Johnny Ward Ranch in Southern Arizona (1962) to

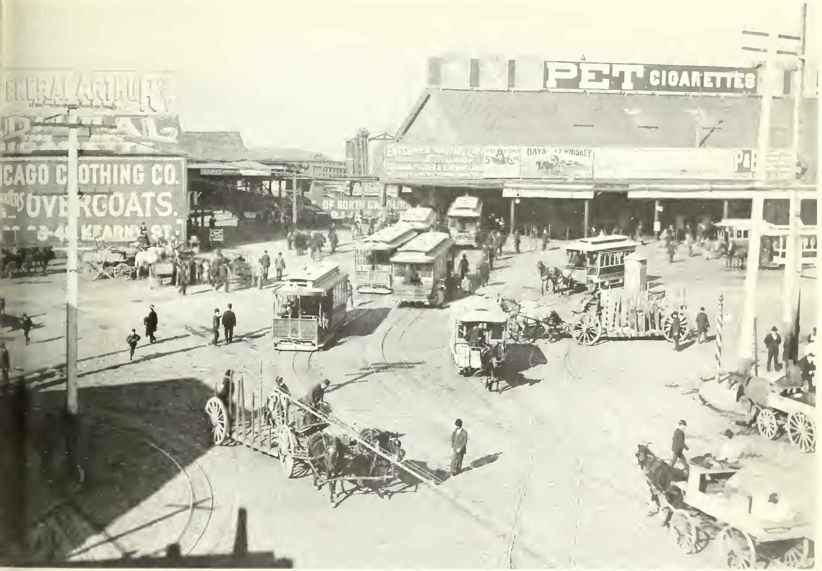


Figure 1.07: Foot of Market Street c. 1890. . . When Section 8B of the great seawall was finished, the ground was laid for the construction of the Ferry Building. Before the erection of that San Francisco landmark in 1896, however, a temporary terminal occupied the spot, linking ferry boats with street car and cable car lines and incidentally providing a fine place for billboard advertisements. (National Maritime Museum at San Francisco)

Bénté's study of the Soscol House in Napa County, California (1978). New work has been undertaken on a variety of other sites, including a Gold Rush ship (Pastron and Prichett 1979) and the Golden Eagle Hotel in San Francisco, commercial establishments from the 1850s in Sacramento (Praetzellis and Praetzellis 1980; Peter Schultz, personal communication), and a nineteenth-century adobe site in San Jose, California (Detlefs 1980). As with the literature of Chinese ceramic ware, most remain unpublished. Lacking the necessary data base, then, the scientifically formulated studies favored by South seem premature.

Accordingly, one central aim of the San Francisco Wastewater Management archaeological program was to accumulate a documented "type collection" of categories of artifacts from the nineteenth century. (A type collection is assembled for reference purposes and is designed to illustrate the range of variability within specific categories of artifacts.) Acquisition of these type collections would be of use in historical archaeology from both substantive and methodological perspectives. For example, analysis of the Chinese ceramics recovered from the N-5 area yields a new picture of the range of products used by San Francisco's Chinese immigrant population in the 1870s and 1880s. It constitutes perhaps the most comprehensive collection of its kind, in fact, forming a basis for comparison with Chinese materials at other late nineteenth century sites in the West. This is of particular interest because Chinese ceramics in other western localities must have reached their destinations via San Francisco.

Similarly, another type collection gathered during the Wastewater Management Program was analyzed to illuminate issues of local and regional economy. Thus, soda water bottles (see Chapter 8) provide the basis for discussing the relations between the San Francisco manufacturers of artificial soda water and the companies which bottled naturally carbonated water from springs (primarily in Napa County) and sold their products in the city. The program's assortment of drug bottles (see Chapter 7) led to a comprehensive discussion of the use of bottled drugs in the late nineteenth century, contrasting the use of prescription drugs with proprietary medicines and offering a background to pharmaceutical practices of the times.

From a methodological perspective, the results of the exploratory borings placed along the San Francisco waterfront have provided broad and varied data which can be utilized to determine the accuracy of mechanical borings as a predictive archaeological technique. In light of the amount of archaeological investigation now being conducted in urban settings across the United States, a critical evaluation of research tools such as borings is certain to be useful (see Chapter 2).

In addition to accumulating and analyzing type collections and evaluating exploratory borings as a research tool, another principal goal of the Wastewater Management archaeological program was the monitoring of excavation activities along the 6.2-mile Channel and North Shore outfalls. The purposes of monitoring were twofold: to mitigate any adverse impact on significant cultural resources previously undetected by archival research and to insure the systematic recording and collection of artifacts whose presence was anticipated within the Channel and North Shore outfalls. Although the possibility of encountering unknown resource seemed remote, it could not be ruled out entirely. The **Niantic**, a Gold Rush ship buried along the old San Francisco waterfront, had been recorded as totally destroyed by the turn of the century, yet in 1978, construction excavation led to the discovery of her hull and a rich treasure of artifacts stored in her hold (Delgado 1980).

A striking example of the success of monitoring for precautionary purposes was the accidental discovery in 1978 of a nineteenth-century sailing vessel within the C-2 alignment on King Street. Although archival research had attempted to locate the remains of any ships buried along the waterfront which might be impacted by the proposed sewer construction, the possibility always existed that ships had been accidentally mislocated in the maps or other documents or escaped recording altogether. When the remains of such a vessel were located on King Street by the archaeological monitor, it was possible to halt excavation in the area of impact before it was totally destroyed. In fact, the vessel section was recorded and studied in situ and then removed and preserved for future study.

With accumulation of type collections and monitoring of excavation, another main objective of the archaeological program was an assessment of the archaeological potential of the variety of landfills behind San Francisco's seawall (see Chapter 3). From 1849 to 1854, for example, the Steuart Street segment of the C-3 alignment was heavily used as a shipping anchorage. Between 1854 and perhaps 1888, the street ran atop a wharf that was the center of great activity. Although preliminary calculations from present city grades and the earliest recorded bay depth suggested that the original bay bottom lay below the depths projected for the C-3 excavations, the possibility of sampling lost or dumped Gold Rush era materials, while remote, still existed. Localized irregularities in the original bay bottom or a combination of rapid silting in the early 1850s and heavy dumping could have raised the level of Gold Rush deposits to a height at which they would be touched by construction.

By contrast, development in the N-4 Harbor View area (the modern Marina district) occurred much later than in the sections of the city closer to the old Yerba Buena Cove. Filled to create the site for the Pan-Pacific International Exposition of 1915, N-4 offered a totally different fill environment to the other segments of the North Shore Outfalls.

In sum, the goals of the archaeological research for the San Francisco Wastewater Management Program grew out of the peculiar features of the proposed construction. While the thrust of the program is more "historic" than "scientific" by standards of archaeological theory, this emphasis results from the need to accumulate an archaeological data base and the necessity of monitoring extensive excavations along the waterfront landfill.

Given the nature of the Wastewater Management Program and its last-minute inclusion of an agreed-upon archaeological plan, there existed little opportunity for the implementation of a far-reaching, comprehensive, meticulously conceived archaeological research design. Perhaps the most crucial reason for this stems from the absence of independent control by the archaeologists over the variables of the project. Input had not been sought from archaeologists during the process of determining project routes and choosing methods of excavation and construction, and, in truth, considerations relating to cultural resource management had not been a part of these decisions. Hence, archaeologists coming into the Wastewater Management Program were forced to set their research goals and plans within the parameters of an already determined project.

While the Wastewater Management Program failed to offer an ideal setting for archaeological research, a number of specific substantive methodological contributions have resulted from the work conducted within the Channel and North Shore outfalls. As noted above, the research resulted in the recovery of an extensive collection of nineteenth-century artifactual specimens. Due to the unanticipated discovery of the C-2 ship, knowledge of nineteenth-century shipbuilding practices has been significantly enhanced. As well, the Wastewater Management Program provided an opportunity for evaluating the applicability of incorporating mechanical, exploratory borings into the framework of archaeological research in an urban setting. Finally, the experience gained in the Wastewater Management archaeological program will be of use to scholars and program administrators alike in their attempts to integrate scientific research into the overall fabric of a large-scale public works construction project.

It is noteworthy that other substantial programs of historical and archaeological research recently conducted in and around the San Francisco waterfront have benefited from the research for the Channel and North Shore outfalls. For example, Wirth Associates (1979a, 1979b), working in close proximity to the Channel area, have utilized historical data presented in **San Francisco Waterfront.** Similarly, although archaeological research for the George R. Moscone Convention Center was targeted on a long-established city block (Olmsted, Olmsted and Pastron 1977b; Pastron 1978d) and yielded, as predicted, features and structures contrasting sharply with those found within the sewer alignments running along public streets through waterfront landfill, the information gleaned from the Wastewater Management archaeological program nevertheless proved very useful in interpreting the artifacts recovered from the Convention Center site. Even more exciting, research along the northeast waterfront at the site of the Levi's Plaza development near Filbert and Battery streets (approximately 100 meters west of the N-3 alignment) has resulted in the prediction through archival sources of the presence of the Gold Rush ship beneath the project area (Olmsted, Olmsted and Pastron 1978). Archaeological testing, using a program of mechanical exploratory borings, later verified the presence of the hulk beyond dispute (Pastron and Prichett 1979) and paved the way for subsequent excavation and study of the vessel. All of this research forms the basis for a growing corpus of archaeological and historical information about the development of San Francisco during the latter half of the nineteenth century.

BACKHOES, BORINGS, AND MONITORS--METHODOLOGY IN THE ARCHAEOLOGICAL PROGRAM

> In the history which follows we have attempted to weave the story told by archaeology together with the story in recorded history in such a way that they become one.
>
> Bernard Fontana, 1962, writing about
> Arizona's Johnny Ward Ranch site

The archaeologist's methods of collecting and analyzing data are determined in large measure by his research goals, the anticipated nature and length of his investigations, the parameters of his budget, and, of course, the type of site or sites under study. Traditionally, most sites have been located in rural areas unmodified, or, at most, minimally altered by recent human activity--the dusty East African plains, the dense forests of the Great Lake States, or perhaps the Southern California deserts. Given this fact, the archaeologist has favored methods of data collection appropriate for use in relatively natural settings where layers of soil have gradually accumulated over the centuries.

Today, however, urban archaeological projects like that conducted in conjunction with the San Francisco Wastewater Management Program confront the field of archaeology with new and often unfamiliar demands. An important site might be marked by a manhole cover rather than a bone embedded in a layer of alluvial soil. In San Francisco, an archaeological site with more than ten feet of cultural deposition might have been submerged beneath the waters of the bay only a century ago. Clearly, the urban archaeologist is being continually challenged to think anew and modify--or even scrap--some of the traditionally accepted (and now perhaps antiquated) ways of working in the field.

Although the particular needs of the San Francisco Wastewater Management Program are unique and although part of its archaeological program was conducted in tandem with massive construction activities, the project nevertheless provides valuable lessons for archaeologists entering the complex realm of large-scale urban archaeological investigations. It also contributes first-hand information regarding novel methods of exploration and the effectiveness of relatively new techniques such as mechanical test borings, on-site monitoring, remote sensing, and oral history, all of which are now being used experimentally at other urban sites in the United States. This chapter outlines the genesis of this unusual archaeological program, describes the application of specific research techniques, and reports on the methodological experience garnered from the project.

A five-phase approach enabled the Wastewater Management Program's archaeological consultants to achieve the Wastewater Program's formal goals as well as additional archaeological research goals. These phases included: (1) an historical and archival survey of the waterfront project area, the results of which appeared in the Wastewater Management Program's 1977 publication, **San Francisco Waterfront** (Olmsted, Olmsted and Pastron); (2) a program of archaeological test borings conducted within each sewer alignment, the results of which were submitted to the Wastewater Management Program in a series of reports (Pastron 1977a, 1977b, 1977c, 1978a, 1978c, 1978d, 1979a, 1979b); (3) archaeological monitoring of construction and concomitant collecting of data along the Channel and North Shore areas and at the N-5 pump station; (4) mitigation of adverse impact to significant archaeological resources encountered through testing or monitoring, including salvaging of artifacts and documenting archaeological features and assemblages; and (5) analysis of data and presentation of findings from the entire program in this report, **Behind the Seawall.** As well, the archaeologists conducted a feasibility study on the use of remote sensing methodologies and utilized oral history techniques to learn about the development of the Channel Creek area transected by the C-4 alignment.

INITIATING ARCHIVAL AND HISTORICAL RESEARCH

As a landmark report on historical cultural resources, **San Francisco Waterfront** assembled information on many diverse aspects of the development of the city's waterfront from the modern Marina district on the northwest to China Basin on the southeast (see Map 1.02). Prepared as the historical basis for the archaeological program, **San Francisco Waterfront** contained archaeological recommendations for each segment of sewer construction, including placement of test borings and procedures for monitoring construction activities.

Construction plans constantly change in a project as large as the Wastewater Management Program. In many cases the historical and archaeological surveys are conducted on the basis of specifications prepared before the awarding of a construction contract. Once a contract is let, the contractor may revise the original specifications with the agreement of the construction manager. This happened in the case of N-2, where plans for the several access structures were later dropped. Construction plans may also change due to unanticipated needs to reroute a part of the work.

The goals of the archival research were twofold: (1) to provide a historical overview of the development of the San Francisco waterfront from prehistoric times through the twentieth century, and (2) to locate and identify any cultural resources which were already listed or potentially eligible for inclusion in the National Register of Historic Places.

In looking at the waterfront, the historical study established the chronology of San Francisco's constant waterfront expansion during the latter part of the nineteenth century. Particular attention was paid to the building of wharves, marking of property lines, laying out of water lots and street lines, constructing of seawalls, and landfilling dates and materials. From maps and newspapers, for example, researchers learned rapid silting occurred under wharves and along the zig-zag line of the first seawall constructed in the late 1860s. They could therefore predict within a few feet the depths at which a silt layer might appear in the course of excavation, as well as the time period during which it had accumulated. Similarly, the historical fact that Steuart Street had been a busy wharf until about 1888 made it likely that quantities of cultural materials rested in the silt and bay mud immediately below the fill deposit in later years. Researchers knew too, however, that excavation for C-3 along Steuart Street would be too shallow to reach down to the bay mud which had over the years been depressed by the heavy fill (**San Francisco Waterfront:** 309). Nevertheless, because the possibility of bay bottom anomalies existed, the Principal Investigator recommended monitoring the C-3 area for archaeological resources during sewer construction.

The placement of exploratory borings was also closely determined by the combination of historical research with projected sewer excavation plans. Thus, although the N-2 tunnel beneath North Point Street would be bored below the original bay bottom--and hence below the level where artifacts would be found--open-cut work for tunnel-access structures would slice through fill known to have contained a rich variety of household and commercial refuse. Accordingly, researchers recommended test borings at the various N-2 tunnel access points (**San Francisco Waterfront:** 711-714).

Exceptional in its depth and vivid descriptions, **San Francisco Waterfront** provides a visual as well as verbal picture of the constantly changing environments behind the seawalls. Based in large part on primary rather than secondary sources (Ibid.: 17), the historical survey utilizes data often slighted by historians, particularly phtotographs and the lithographed "birdseye views" of the city that were popular during the nineteenth century. These sources provided information for reconstruction of physical features and prediction of archaeological resources which is often not available in written materials.

San Francisco Harbor Commission records and Gerald Dow's work on bay filling in San Francisco (1973), for example, provide information about the dates of work on the first sections of the seawall near the N-5 pump station, the construction specifications, and even the sorts of fill placed behind the wall. Additional notes consulted by researchers in the San Francisco Port Authority office report tellingly that "the filling behind the wall consisted of defective or soft stones from the quarry, quarry scrapings, sand from the dunes of the city and, subsequent to 1877, of mud dredged up from the waterfront. This area was surfaced with macadam or paving when it had sufficiently settled" (**San Francisco Waterfront:** 488). Nowhere, however, did researchers find written information about when the filling was completed.

Only historical photographs of the N-5 site offer clues to the solution of this problem. Figure 2.01, showing the site as it appeared in 1883, indicates the progression of the filling and demonstrates that much of it had been completed in the area of N-5 which lies immediately behind the Seawall Hotel. In fact, a scatter of trash already litters the newly filled land surface, much of it probably dumped from the hotel itself.

DEFINING CHRONOLOGICAL PERIODS

In the **San Francisco Waterfront** project, historical researchers divided the history of San Francisco into eras such as the "Gold Rush" or the "City-Building Period." This facilitated discussion of the development of the city in terms of different activities which might have left archaeological remains. Not absolute terms, these periods varied according to the development of each section. Thus, in discussing C-2 on King Street, "Gold Rush" applies to the lengthy period 1851-1863, because no significant activity took place along what became King Street in the early years and because the shoreline went unmodified until 1863 (Ibid.: 163). On the other hand, because the C-3 alignment traverses the original Yerba Buena Cove, it was assigned the more common Gold Rush demarcation years, 1849-1857, since extensive commercial development had all but transformed the area by 1860.

Prehistoric (c. 200 BC-1776 AD)

This period, based upon current archaeological understanding of the original occupation of the San Francisco Bay Area, extends from the first reliably dated human settlement of the region to the arrival of the first Spanish explorers in the second half of the eighteenth century (Margolin 1979; Gerow and Force 1968; Fredrickson 1968; Wallace and Lathrap 1975). Finding cultural remains from this period in any of the Channel or North Shore outfalls seemed most unlikely since the sections lay submerged beneath the waters of the bay prior to landfilling in the nineteenth and twentieth centuries. The few exceptions to this pattern occur where the sewer alignments intersect the original shoreline, as at Sand Point within N-4, Black Point at the western end of N-2, and Steamboat Point on C-2. The N-1 tunnel beneath Fort Mason will be bored far below the level where prehistoric materials might be found. (However, in 1978, such ancient cultural deposits were discovered and excavated at Fort Mason far **above** the level of the Wastewater Managment's N-1 sewer tunnel (Baker 1978).)

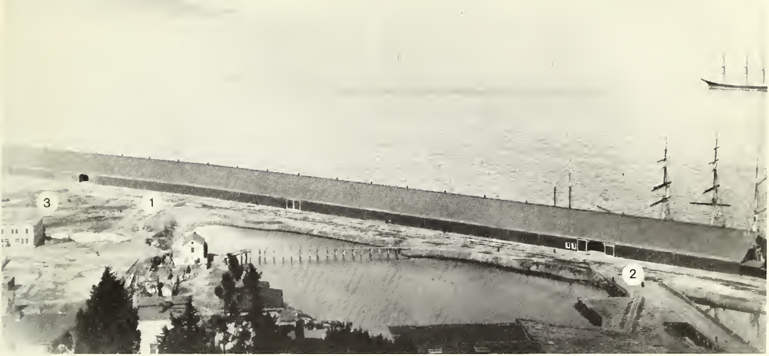


Figure 2.01: Kearny Street and the N-5 Pump Station Site c. 1883. . . Taken from Telegraph Hill, this panorama plate illustrates the kind of information retrievable from historical photographs. The long grain shed, where California's "vegetable gold" was stored and loaded onto sailing vessels, was built over the newly constructed seawall, along what is today's Embarcadero. Kearny Street (1) had already been filled, as had the interior of the block immediately to its west, where much of the N-5 excavation took place. To the east, the block between Kearny and Montgomery (2) remained unfilled. Laundry hangs outside the Seawall Hotel (3), while a litter of trash is visible on the newly created land surface between the hotel and the grain shed. (Wells Fargo History Room)

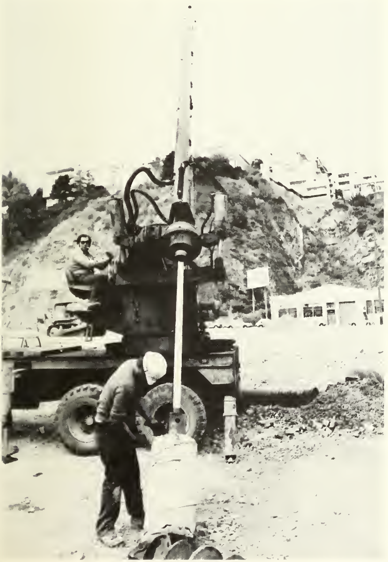


Figure 2.02: Readying the "Clam Bucket". . . This truck-mounted drill rig with its "bucket" can take soil samples as deep as 33 feet, an important feature for probing the fill behind the seawall. The flight auger (spiraling off bottom edge of photo) proved useful for bringing up samples only until groundwater was encountered. Visible around the truck is the old broken rock fill blasted from Telegraph Hill, perhaps from the shattered eastern face appearing in the background (see Figure 3.05). Michael Love)

Spanish, Mexican, and Early American (1776-1848)

In general, the geographic features limiting human use of the Channel and North Shore outfall areas during the prehistoric era apply equally to this period. Only an occasional object lost or discarded from a boat and somehow incorporated into later landfill might be recovered. Chances of an interesting find from the Spanish period, for example, are lessened even further because in some places, such as C-3 or the southern Embarcadero, excavation will not reach the original bay bottom, while in others, such as the N-2 tunnel, it will proceed far beneath the level of the culture-bearing fill (**San Francisco Waterfront:** 225).

Gold Rush (c. 1848-1857)

With the vast influx of population after the discovery of gold in 1848 and the attendant boom in commerce, the expansion of the city front into the waters of the bay began immediately. Landfilling, trading in "water lots," and claims on yet-to-be-filled blocks provide the basis for some of the most colorful accounts in California's history (see **San Francisco Waterfront:** 443-474). Much of the intensive waterfront activity of the Gold Rush years, however, centered several blocks to the west of N-3 and C-3 along the shore of the former Yerba Buena Cove (see Map 1.02).

City Building (c. 1858-1887)

Following the explosive growth of the Gold Rush came a period of more orderly development, during which the city expanded steadily toward the east through continued landfilling. This period was marked by a consolidation of building efforts, including construction of San Francisco's first seawall in the late 1860s which formed a zig-zag front along the portions of the waterfront it encompassed (**San Francisco Waterfront:** 486).

Late Nineteenth Century (1866-1906)

With minor variations for individual alignments within the Channel and North Shore outfalls, this period opens with the construction of the city's second seawall which rounded the city front to its present configuration. The fill dumped behind this newer seawall is, for the most part, what the Wastewater Management Project archaeologists encountered during the excavation of the Channel and North Shore sewer alignments.

Using information from the construction specifications for the seawall sections, it is possible to determine the dates when filling started. The dates for completing the filling, however, must be determined from sources such as maps, photographs, and personal reminiscences. The earliest Sanborn Insurance Company maps, which show the city in 1886-1887, helped pinpoint the buildup of various blocks, the activities in the areas, and the names of the firms doing business. With their keyed representations of buildings and streets, these maps indicate height, construction materials, placement of water and gas pipes, and a wealth of other information concerning the structures, adding a depth of detail for the period unattainable for earlier times. An updated version of the Sanborn maps issued in 1905 depicts the city as it appeared on the verge of the great conflagration of 1906.

Development of the waterfront south of Market Street (the Channel or "C" alignments) lagged behind that of the original Yerba Buena Cove to the north. Construction of the new seawall segments extended into the 1910s, with debris and rubble from the 1906 earthquake and fire being incorporated into the fill.

The year 1906, however, forms a convenient termination point for archaeological investigations in San Francisco. The charred black layer of devastation caused by the fire is eaily visible as an archaeological horizon, and the rebuilding of the city following the fire ushers in a new era. Many of today's buildings date to the reconstruction, about which a wealth of information is available from publications, maps, photographs, and living informants. All of these resources are more accessible and less expensive to consult than archaeologically retrieved data. Thus, except for the earthquake and fire-related landfill encountered along C-3, this archaeological account is limited to the years preceding 1906.

DETECTING ARCHAEOLOGICAL RESOURCES

The archaeological program relied on two principal methods of data recovery. The first was systematic placement of test borings, and the second was monitoring of mass excavation activities and concomitant data collecting and recording.

In addition to these primary techniques, two other approaches were utilized in the search for resources. Remote sensing techniques, used successfully at some prehistoric and rural historic-period sites (Lyons and Avery 1977; Lyons and Ebert 1978) to locate buried archaeological features, were applied experimentally within the context of nineteenth-century urban landfill. The results, which proved negative along the San Francisco waterfront, are discussed in more detail below and in Appendix E.

On occasions, the collecting of oral history through interviews with older persons familiar with particular sections of the city was also used as a technique for gathering data. In writing about the South of Market Street waterfront, for instance, historians Roger and Nancy Olmsted relied in part on the reminiscences of Captain Fred Klebingat, who recalled sailing into San Francisco Bay in the early years of the twentieth century when the water in Channel Creek (adjacent to the C-4 alignment) would "turn white lead paint black in one night" (**San Francisco Waterfront:** 127). The use of oral history as a technique in historical archaeology is discussed below.

The decision to use borings and monitoring as resource identification and data collection techniques, as outlined in Chapter 1, resulted from the conditions imposed by the placement of the sewer route through landfill behind the seawall and by the EPA's original Memorandum of Agreement concerning the archaeological program. The Memorandum outlined specific conditions and techniques for framing the archaeological procedures at the C-1 and C-4 sites, and once these testing results had been obtained, the procedures were extended to become the format for archaeological testing along the other alignments.

Test Borings

Mechanical borings are not commonly listed among the archaeologist's armamentarium. The archaeologist, in fact, is much more likely to be trained to handle a dental pick and camel-hair brush than don a hard hat and direct the activities of a truck-mounted diesel drilling rig. Yet, the Wastewater Management Program required the use of more than one such novel archaeological technique.

The decision to use mechanical borings as a testing technique was made in the formative stages of the archaeological program. Although the EPA's Memorandum spelled out in only the broadest terms the goals of the overall archaeological investigations, it was highly specific in its provisions for the kind of boring program to be conducted. It required a test boring program for the C-1 and C-4 alignments, and subsequently this program was extended to the remaining Channel and North Shore areas. Because the Memorandum's detailed provisions were instrumental in shaping this key component of the archaeological program, that portion of the document is quoted below.

> Test boring and monitoring shall occur as interim measures until determinations of eligibility for placement on the National Register of Historic Places are made on the basis of these borings.
>
> Ten 12-inch test borings will be made to the depth of bay mud. If cultural resources are encountered, up to five additional 24-inch borings may be made at the discretion of the principal investigator.

As specified in the letter from the Advisory Council on Historic Preservation, the following field techniques of data recovery were instituted to meet the following requirements:

- a. All work must be fully recorded with profile drawings and full descriptions of the strata encountered;
- b. Concentrations of related classes of material should be noted and recorded;
- c. All speciments recovered should be segregated by stratum and depth;
- d. Test boring samples should be collected in increments of 12 inches, but no more than 18 inches;

e. The depth of the borings should be equal to that of the proposed excavation;
f. The report should contain an inventory of each sample; and
g. The principal investigator should also look for an evidence of prehistoric or paleontological materials which may be concentrated.

Within these parameters, test borings were utilized for two main purposes. Some were targeted to probe for specific targets, for instance, Borings #5, 6, and 7 at C-2 were placed over the former Steamboat Point, site of much maritime-related activity. Since this was one of the few places where the course of the sewer crossed the original San Francisco shoreline, it was possible that artifacts from the prehistoric or early historic periods might be encountered. In addition, there was the distinct possibility of recovering remains from shipbuilding activities of the 1850s and 1860s (**San Francisco Waterfront**: 32). Other borings were intended as purely exploratory probes to sample the soil types and the cultural content of the subsurface deposits at randomly selected spots. Along North Point Street's N-2, these exploratory borings were placed to test the potential of the only locations where open-cut construction excavation was planned (**San Francisco Waterfront**: 709, 714).

Mechanical borings promised to be the most feasible means for achieving the type of sampling required for the Channel and North Shore sewer alignments. (As the program proceeded, in fact, larger diameter borings were adopted in order to gain larger artifact samples.)

While mechanical test borings are not an ideal technique for scientific inquiry, they often offer the only feasible method of recovering archaeological data in an urban context. Data from borings, while subject to constant refinement based on increasing archaeological sophistication in the use of drilling implements, may sometimes be obtained in no other fashion--at least not at a cost likely to be underwritten by any sponsoring agency. Consider the requirements of testing behind the seawall:

. Excavation for construction was planned to go as deep as 25 feet below the present-day street surface. Testing, therefore, needed to reach that depth, preferably slightly deeper. But federal and state safety regulations prohibit work in unshored trenches more than 60 inches deep, and as depth of excavation increases, the shoring required to meet safety standards becomes increasingly bulky and expensive to install. Test trenches therefore become prohibitively expensive and impractical.

. Ground water occurs at elevations from 6 to 15 feet below street level along most of the sewer route. Use of test trenches and other common means of archaeological investigation is therefore seriously impeded (see Figure 4.36).

. The sewer construction route extends several miles in length. Any useful archaeological method therefore needs to be fast and reasonable in cost. Again, trenching is unfeasible; boring is not.

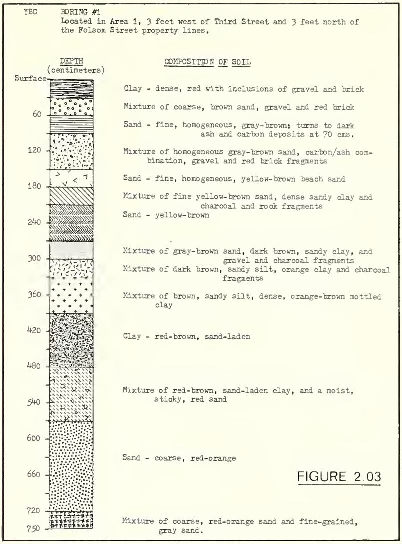
For obtaining soil and artifact samples, two boring techniques are currently available. The "core barrel" method is frequently used by geologists to obtain samples for compiling sub-surface profiles. It uses a small (8-inch diameter) "flight" or spiral-bladed auger inside a casing. At intervals, the flight auger is withdrawn, and the core barrel is attached to the drill shaft and lowered into the hole, where it obtains a sample from the level immediately below the maximum depth reached by the auger. The core barrel is then withdrawn and the flight auger replaced until the next level for sampling is reached. The advantages of this technique are that it avoids the possibility of contamination of lower levels by material which has dropped down from above, and it provides an unmixed sample of the stratum or strata through which the core barrel passes. For archaeologists, it has the disadvantage of obtaining only an extremely small sample, thus making it difficult to compile the kind of artifact collection required for estimating the potential significance of a site.

At the beginning of the Wastewater Management archaeological program, the core barrel technique was used for six of the test borings along N-3. The slowness of the procedure, coupled with the small size of the soil samples obtained, led to abandonment of the technique as archaeologically inefficient.

The other tool available to archaeologists, and the one adopted for the remainder of the Wastewater Management Program, is the large 18-inch, 24-inch, or 30-inch diameter) flight auger. The larger auger bits bring up

Figure 2.03: Soil Profile Compiled from Test Boring. . . A wide variety of soils often may be encountered in a single boring, as is apparent in this profile drawn from a test probe at the site of the Moscone Convention Center under construction south of Market Street. Comparison with Figure 2.04, where the discrete archaeological strata are visible, reveals the degree to which mixing of soil types occurs on the auger blades. (Janice Narita Pastron)

Figure 2.04: Soil Profile from Test Trench 1, Moscone Convention Center. . . shows the features and strata penetrated by Test Boring 1 (see Figure 2.03). The black bank of charcoal and rubble left from the 1906 destruction of the block by earthquake and fire is more recognizable as a clearly demarcated stratum in the trench profile than in the boring. While mechanical borings may be the only feasible sampling technique for deep urban landfill deposits, careful attention must be paid to the mixing of soils which occurs during augering. (Janice Narita Pastron)



BORING #1
Located in Area 1, 3 feet west of Third Street and 3 feet north of the Folsom Street property lines.

Clay - dense, red with inclusions of gravel and brick

Mixture of coarse, brown sand, gravel and red brick

Sand - fine, homogeneous, gray-brown; turns to dark ash and carbon deposits at 70 cms.

Mixture of homogeneous gray-brown sand, carbon/ash combination, gravel and red brick fragments

Sand - fine, homogeneous, yellow-brown beach sand

Mixture of fine yellow-brown sand, dense sandy clay and charcoal and rock fragments

Sand - yellow-brown

Mixture of gray-brown sand, dark brown, sandy clay, and gravel and charcoal fragments

Mixture of dark brown, sandy silt, orange clay and charcoal fragments

Mixture of brown, sandy silt, dense, orange-brown mottled clay

Clay - red-brown, sand-laden

Mixture of red-brown, sand-laden clay, and a moist, sticky, red sand

Sand - coarse, red-orange

Mixture of coarse, red-orange sand and fine-grained, gray sand.

FIGURE 2.03

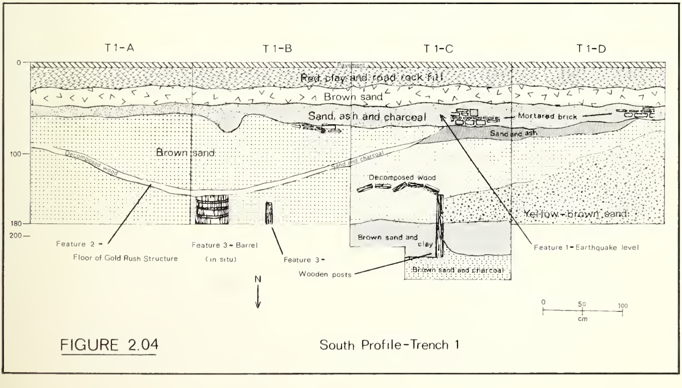


FIGURE 2.04

South Profile-Trench 1

a large soil sample from each 12-inch increment of depth and are even capable of bringing up bottles in an unbroken condition (see Figure 2.02). When ground water level is reached and the flight auger loses its effectiveness (water at the bottom of the hole washes the soil off before the drill can be retracted), operators switch to a "clam bucket" which collects the soil sample for opening after the surface is reached (see Figure 2.07).

Among the drawbacks to the use of the flight auger is the potential for damage to artifacts or features which it encounters. Because the drill bit is strong enough to penetrate a wooden floor, it is obviously capable of smashing bottles or ceramic items. Thus the chance for recovery of intact artifacts is lessened. Another drawback, already mentioned, is the problem of soil and artifacts falling from upper levels of a hole into the lower levels as drilling proceeds, thus falsifying the stratigraphic evidence.

A third problem is the mixing of stratigraphic layers within the hole. This mixing of strata becomes apparent when an archaeological trench is placed near a test boring, and a hand-excavated profile may be compared to one compiled from the auger sample. On the Wastewater Management Project, this sort of a comparison was not possible because time-consuming and expensive test trenches were not employed.

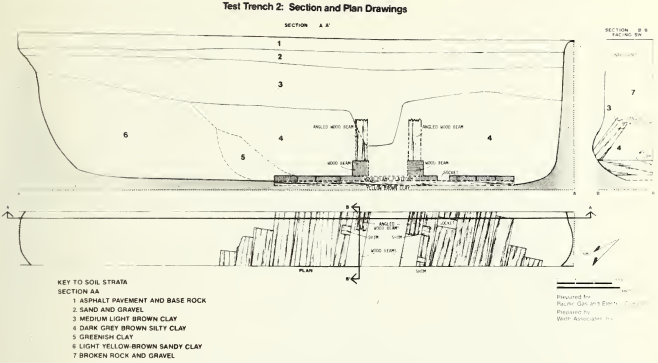
An example drawn from another project in San Francisco, the George R. Moscone Convention Center, illustrates the problem clearly. Figure 2.03 shows the profile of a test boring conducted near the corner of Third and Folsom streets; Figure 2.04 illustrates the south profile of a test trench excavated less than a meter from the test boring and passing through the same strata. In the wall of the test trench unit (see Figure 2.04), the stratigraphic layers are distinct, each one assignable to a particular origin. Immediately beneath the asphalt surface of the parking lot where the trench was dug is a band of red clay ranging from 10-15 centimeters in thickness, which had been laid down as a base for the asphalt paving. Totally devoid of artifact content, it is clearly exotic to the site. Below it is a band of the gray-brown sand native to the convention center block which had accumulated when the spot lay open to the wind, probably immediately after the demolition of the buildings on the block in the early 1970s. Beneath this layer appears a distinctive black slash marking the devastation of the 1906 fire which swept the entire block. The fire-burned layer in turn rests on succeeding layers of the native sand, within which the remains of an earlier structure which had occupied this corner lot can be discerned.

The data obtained from the test boring (see Figure 2.03), while indicating the same sequence of strata, are not nearly as clear. The layer of red clay fill is distinct, and the 30-60 centimeter level reveals the brown sand which appears in the profile on top of the 1906 fire burn layer. The earthquake layer, however, is not recorded until moving 10 centimeters into the succeeding level. This level, some 60-90 centimeters in depth, is described as a mixture of homogeneous gray-brown sand laced with carbon, ash, and gravel and red brick fragments. So is the succeeding level. While this is an accurate rendering of what was observed on the blades of the flight auger, the description clearly mixes two distinct soil layers—one primarily sand, the other primarily ash, charcoal, and rubble. As a consequence, the ash and charcoal from the earthquake appear to extend as deep as 150 centimeters, whereas in fact the trenching shows that they are restricted at this corner of the block to a relatively thin band about one meter in depth.

Thus, the data from the test boring and the exploratory trench differ quantitatively, if not qualitatively. Appearing as a highly distinctive soil layer in the trench, the 1906 burn layer could not be so described on the basis of the test boring, although it might be deduced from the known history of the block.

While test borings may blur stratigraphic layers, they nevertheless reliably indicate major subsurface phenomena. A layer of thick black-clay, for example, often signifies the original bay bottom, a helpful marker in assessing the extent of landfill deposit along the waterfront. Architectural features, such as buried floors or foundations, are also clearly apparent from test boring data.

Archaeological excavation carried out to assess the environmental impact of a proposed Pacific Gas and Electric Company (PG&E) transmission line along King Street provides another opportunity to compare data obtained from trenching with data derived from exploratory borings. King Street's C-2 Test Boring #5, targeted to probe Steamboat Point (Pastron 1978a:



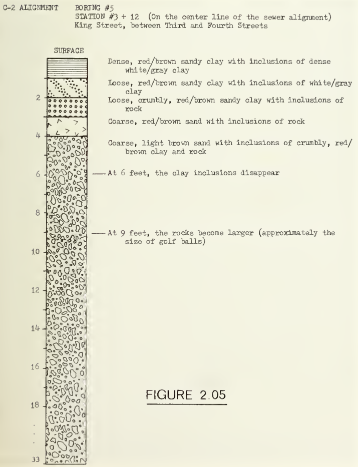

C-2 ALIGNMENT
BORING #5
STATION #3 + 12 (On the center line of the sewer alignment)
King Street, between Third and Fourth Streets
SURFACE
Dense, red/brown sandy clay with inclusions of dense white/gray clay
Loose, red/brown sandy clay with inclusions of white/gray clay
Loose, crumbly, red/brown sandy clay with inclusions of rock
Coarse, red/brown sand with inclusions of rock
Coarse, light brown sand with inclusions of crumbly, red/brown clay and rock
At 6 feet, the clay inclusions disappear
At 9 feet, the rocks become larger (approximately the size of golf balls)
2
4
6
8
10
12
14
16
18
33

FIGURE 2.05

Figures 2.05 and 2.06: Comparison of a Test Bore and Trench Profile on King Street. . . reveals the strong congruity between the two. A capstan from the boatworks on Steamboat Point, exposed in the trench, had been dug and set into the original soil of the point (Soil Stratum 6, Figure 2.06). This same soil was encountered in Test Boring 5 on the C-2 segment. (Janice Narita Pastron; Wirth Associates)

26-29), fell just east of one of the three structures shown at the western edge of the tip of the point on the 1853 Coast Survey map (see Map 4.02 and Figure 2.05). The northeast end of the PG&E test trench was 29 feet away on the opposite side of the building on the slope leading to the shoreline of Mission Bay (Wirth Associates 1979a: 17-23).

Data from Boring #5 produced the subsurface profile shown in Figure 2.05. The sandy-clay soil horizon encountered at 4 feet below surface was assumed to represent the original sand formation of Steamboat Point because: (1) the soil horizon continued downward unaltered until the boring was abandoned at a depth of 33 feet; (2) all 29 feet of this layer were totally devoid of cultural materials; and (3) a comparison of early and present street grades indicated that about 4 feet of fill had been laid at this spot to bring King Street up to grade.

The data from the PG&E trench offers an interesting comparison (see Figure 2.06). This trench uncovered the remains of the lower portion of a heavy wooden capstan, presumably used to haul ships along a marine railway to drydock (Wirth Associates 1979a:20). The exposed portions had originally been buried to counterbalance the massive loads being winched. Outlines of the excavation pit apparently dug to install the capstan base appear in the stratigraphic profiles, lending support to this interpretation. The native soil which was excavated for the capstan in the 1850s is described in the Wirth Associates' report as a "light yellow-brown sandy clay," the surface of the soil horizon being between 2-1/2 and 4 feet beneath the present day ground level at the eastern end of the trench. This description of the soil layer and its depth fit closely enough with the data extracted from Boring #5 to mutually confirm identification of the original land surface.

Wirth Associates subsequently opened another trench 70 feet to the northeast of their original test excavation unit; this second trench confirmed the identification of the original land surface of Steamboat Point. The latter trench, however, was totally devoid of artifactual material, with the exception of one brick found in the fill. This finding is harmonious with the results of the Wastewater Program's C-2 Boring #5, which was also sterile.

For archaeological testing, the effectiveness of controlled excavation over mechnanical exploratory borings is evident in a location such as Steamboat Point. At their largest only 30 inches in diameter, test borings are extremely limited in the amount of ground sampled, and they run a high risk of completely missing small features. The US Coast Survey maps of 1853 and 1859, while extremely accurate in a general sense, are drawn to a scale of 1:10,000. Working with a map made on such a small scale means that even the width of the printed lines on the charts introduces a factor of error in pinpointing specific archaeological features. Coupled with the tendency of the map makers to portray structures in sparsely inhabited parts of the city as slightly larger than actual scale, this means that even with painstaking measurements a small shed targeted for a test boring could easily be missed entirely. A six-meter trench, however, is far less likely to miss a targeted structure, even if the location of the test excavation unit has been selected on the basis of measurements plotted from a map scaled at 1:15,000. In the Steamboat Point location, the deep threshold of ground water, combined with the absence of need to excavate deeper than five feet, made trenching a more feasible and ultimately a more productive testing strategy. (A fuller consideration of the comparative utility of trenching and mechanical exploratory borings under various conditions appears in Chapter 12, the concluding section of this report.)

Mechanical borings nevertheless offer the main technique for identifying the location of deeply buried architectural features such as the remains of floors, walls, or the hulks of buried ships, the latter being a potential resource of substantial concern along the San Francisco waterfront. Test borings, for example, near the intersection of Filbert and Battery streets at the site of the Levi's Plaza Development project along the northeast waterfront some 100 meters to the west of the Wastewater Project's N-3 alignment did clearly indicate the remains of a Gold Rush ship which archival research had predicted would be at this spot (Olmsted, Olmsted and Pastron 1978). To prepare for the archaeological testing, an imaginary grid was laid out over the project area with intersection points every 20 feet. Test borings were then made at these points.

Prior to the borings, archaeologists established criteria to help distinguish the remains of a nineteenth-century ship from the remains of wharves or other wooden structures which might be buried within the project area. They concluded that (1) the boring would have to encounter hardwoods, particularly oak; (2) the wood would have to be found in quantities large enough to indicate penetration of the structural elements of a ship hull; (3) the remains of a postulated ship would have to be found within a stratigraphic context in accord with the findings of archival research (generally this would consist of fill material inside the original hull and bay mud outside the old hull--or a fill-wood-mud sequence on the bore sample); and (4) the discovery of maritime-related artifacts such as tree-nails or ballast stones in association with hardwood would further confirm the presence of a buried ship (Pastron and Prichett 1979: 15).

The identification of the ship buried within Levi's Plaza demonstrates that mechanical exploratory borings can be successfully utilized in the investigation of deeply buried archaeological resources, provided that a comprehensive program of archival study and research strategy are undertaken in advance of the field investigations. (The ship at Levi's Plaza was later subjected to controlled excavations which allowed historians and archaeologists to conduct a more thorough analysis of the vessel (Pastron and Prichett 1979, Pastron and Prichett 1980).

DETECTING ARCHAEOLOGICAL RESOURCES: CONSTRUCTION MONITORING

In addition to test boring, a program of archaeological monitoring of the ongoing sewer construction was planned from the beginning of the Wastewater Management archaeological program (Olmsted, Olmsted and Pastron 1977). The EPA Memorandum, the key document delineating the archaeological procedures to be used, is quoted here:

> Monitoring, Sampling, and Collecting: The principal investigator, or one of the field assistants under this direction, maintain daily telephone contact with the resident engineer, who shall provide up-do-date information as to the type of material that is being produced by the excavations. In addition, the principal investigator or more of the field assistants under his direction shall make periodic on-site inspections of all areas being excavated within the contract areas. The frequency of these visits shall be determined by the speed at which excavation and construction activities proceed. During monitoring, the principal investigator or the field assistant(s) working under his direction may collect random-grab samples of the material being excavated. The amount of material collected shall be determined by the principal investigator. These samples shall be sifted and artifacts shall be collected, recorded, analyzed, and stored. By using these procedures, it is believed that construction activities can proceed without undue impediment, but that any cultural materials of archaeological or historical significance can be observed, noted, recorded, and collected. Further, in this manner, the principal investigator shall be in a position to be (in) daily contact with the resident engineer and field assistant(s), and shall be in a position to immediately recommend a cessation of construction activities should a find of sufficient importance be made.

Accordingly, provisions for on-site monitoring were written into the subsequent archaeological proposals appearing in **San Francisco Waterfront.**

As thus defined, the monitoring program had two main goals. The first was the amassing of a reference or type collection of artifacts characteristic of the various landfill contexts encountered during excavation and construction along the Channel and North Shore Outfalls. These artifacts would be accompanied by data describing their source and stratigraphic context, as far as determinable within the limits imposed by the ongoing construction project.

The second goal of archaeological monitoring was to protect against adverse impact to archaeological resources eligible for inclusion in the National Register of Historic Places. Although extensive archival research had indicated that the chances of unanticipated adverse impact were slight, it could not be ruled out entirely, and some form of precautionary archaeological monitoring within the Channel and North Shore outfalls therefore seemed prudent. Given San Francisco's rapid development after the Gold Rush, a significant archaeological resource could have been incorporated in the rapidly accumulating waterfront landfill without notice in the contemporary chronicles.

As specified in the EPA Memorandum, the procedures of the archaeological monitoring program delegated overall responsibility to the Principal Investigator, while much of the daily on-site observation and data collection were to be carried out by archaeological field assistants. These assistants were required to possess an undergraduate degree in the fields of anthropology or archaeology and to have had six weeks of previous field experience in historical archaeology (**San Francisco Waterfront:** 234).

The task of integrating the archaeological monitoring program with the impending construction project was assigned to the Principal Investigator. To minimize possible conflicts between archaeological and construction goals, the Principal Investigator met with the resident engineer and construction crew chief prior to the commencement of construction activities on each contract section. During the course of these meetings, the Principal Investigator explained the goals of the archaeological program and its federally mandated status which therefore made monitoring an important and integral component of the project. He also emphasized that all artifactual materials encountered during the course of construction belonged to the City and County of San Francisco and that all construction personnel were expected to assist the archaeological team in their efforts to record and collect these materials. Finally, the resident engineer of each project was charged with the responsibility of insuring that his crews cooperated with the archaeologists during the monitoring program.

At first, the archaeologists had difficulty in accustoming themselves to working in the center of a large-scale, highly pressured, multi-million dollar urban construction project. Many workers and engineers were skeptical of the archaeological program and viewed the presence of the monitors as another bureaucratic impediment standing between them and the swift, efficient completion of their work.

Friction between the construction and archaeological crews took a number of forms. For example, it has long been customary practice for truck drivers and heavy equipment operators to scavenge bottles and other artifacts uncovered during excavation. These practices were strictly prohibited on the Channel and North Shore projects, and the monitoring program therefore eliminated one of the traditional perquisites of construction work. On a more significant level, many of the workers and contractors feared that the archaeological monitoring would cause long and capricious construction delays resulting in workers being laid off. The contractors, of course, were well aware of the fact that the Principal Investigator was empowered by the EPA Memorandum to temporarily cease construction activities in the event that archaeological resources were encountered which were potentially eligible for inclusion in the National Register.

Despite the initial mutual skepticism between construction and archaeological personnel, each quickly grew accustomed to the other. During two years of archaeological monitoring, the procedures worked effectively without undue impediment to construction schedules or personnel. The only archaeological find encountered which required alteration of construction schedules was the remains of the wooden sailing ship discovered within the C-2 alignment in 1978 (see Chapter 4).

During the first year of the program, two monitors were employed on a full-time basis--one for observing excavation within the Channel area and the other for conducting similar activities within the North Shore area. At the end of 1978, one individual was assigned to monitor all of the segments under construction, working with assistants if the progress of construction or the unearthing of particular finds warranted this addition. During the first quarter of 1979, when excavation at the N-5 pump station uncovered an extensive nineteenth-century refuse dump, four archaeological assistants worked to help recover the artifacts (see Chapter 5).

Although strangers to established construction routines, the archaeological monitors were quickly assimilated into the structure of the project, taking their place beside the various inspectors, engineers,

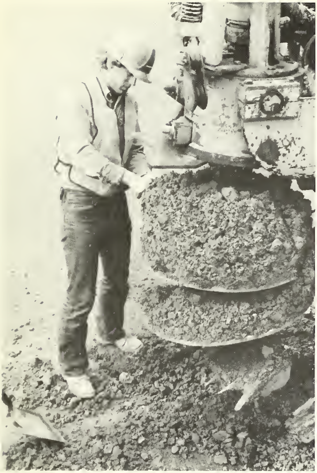
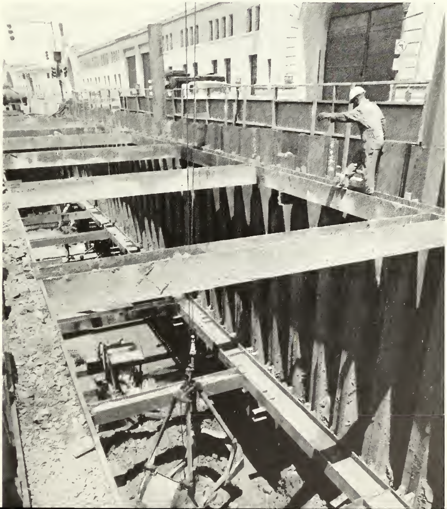


Figure 2.07: Checking Soil on the Auger Bit. . . Along the N-2 section, the 30-inch auger bit was used to maximize the volume of soil sampled. The archaeological crew then made soil observations and screened the sample for artifacts directly off the auger blades. The crumbly rock visible in this scene at the intersection of Leavenworth and North Point streets was decomposing sandstone from the foot of Russian Hill. (Jack Prichett)

Figure 2.08: Excavating the Sewer Culvert Along N-3. . . Pier facades along the east side of the Embarcadero indicate the proximity of the alignment to the waterfront. Along N-3, much of the behind-the-seawall fill consisted of broken sandstone and shale from Telegraph Hill and dune sand from other parts of the city. Archaeological crews recorded the location of artifact finds and observed features using engineering "station numbers", such as the one beneath the workman's outstretched hand. The steel "sheet piles" lining the wall of the deep excavation prevented the crews from observing the stratigraphy of the side walls. (Robert M. Quan, WMP)



photographers, surveyors, and others who have become essential components of any large-scale contemporary urban renewal project. The monitors struck up working relationships with the resident engineer on each alignment, established regular observation rounds, and were included in meetings to plan construction schedules.

The archaeological monitors were equipped with tape measures, trowels, shovels, log books, plastic sample bags, masking tape, and marking materials. Once in the field, they relied on the cooperation of equipment operators and truck drivers to locate, record, and collect archaeological materials. Occasionally, the abrogation of the workers' traditional rights to pocket artifacts led to confrontations. "Dave," a monitor at the N-5 dump site, witnessed a Chinese teapot disappearing into a worker's coat. When the worker, an avid bottle collector, refused to relinquish the artifact, the monitor was forced to consult the resident engineer, who was, as noted above, charged with the ultimate responsibility of insuring that the archaeological program functioned smoothly. In this case and according to established procedure, the resident engineer informed the worker of the statutory requirement to yield up his prize: Turn over the artifact or lose a job. Later in the afternoon, "Dave" was approached by the angry worker. "I didn't know if he was going to give me the teapot or a split lip," he later confided. However, the teapot came forth, and thereafter amity and archaeological rights of eminent domain reigned at the site of the N-5 refuse dump.

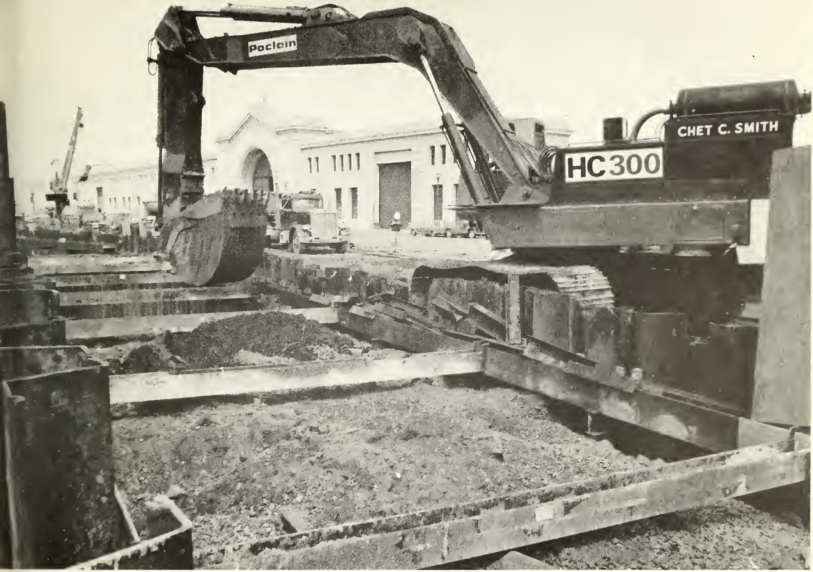
Construction along the North Shore and Channel Outfalls consisted mostly of building a huge reinforced-concrete storm culvert some 20 feet wide and 20 feet deep. Installation of this immense structure required excavation to depths of 23 feet or more below street surface (see Figure 2.08). Since the sewer ran along the waterfront, these depths meant that much of the construction took place considerably below the groundwater line. Generally, excavation for a particular segment began at one end of the alignment, and construction of the culvert followed immediately behind. Occasionally, however, excavation took place simultaneously at two or more locations on a single alignment. All of these factors affected the archaeological monitoring program.

The depth of the excavation required the driving of interlocking metal plates or sheet piles to reinforce the earth walls against the possibility of collapse. Of necessity, the piles were driven prior to excavation. From an archaeological point of view, however, the presence of the wall of sheet piles made it impossible to record the stratigraphy of the sidewalls of the excavation (see Figure 2.09).

Excavation usually occurred in five-foot levels, units far too crude for any meaningful observation of soil types. Artifacts in the form of innumerable bits of metal, window glass, and ceramic sherds or fragments laced the fill being excavated along most of the waterfront. More significant concentrations of complete bottles and ceramics occasionally appeared, at which time monitors carefully watched for a possible dump site such as that uncovered at N-5. It was usually impossible, however, for the monitor to descend into the trench to observe the digging because of safety requirements and the lack of means of access and egress. In many places, the soil was water logged at depths below 10 or 15 feet, resulting in heavy clay-mud ground which made walking impossible.

Most artifacts, then, were not covered in situ but rather removed by a backhoe during the course of excavation and subsequently collected by the monitor. Proveniences or positions were designated by reference to station numbers employed in construction, which are permanently linked to city datum and bench marks. Elevations along the excavation were regularly determined by city surveyors and marked on the tops of pilings lining the excavation. These were used to record the vertical positions of artifacts.

Since monitors were generally responsible for observing construction on more than one alignment at the same time, they shuttled back and forth between excavations. This fact, coupled with the previously noted impediments to observation, meant that the monitoring program was more valuable as a safeguard against accidental impact to an archaeological feature than as a means of obtaining reliable data on the exact position of individual artifacts. Given the limitations of a monitoring program, only large or striking architectural features tended to come to a monitor's attention--pilings from buried wharves, street surfacing at lower grade levels, foundations, or the hull of a ship.



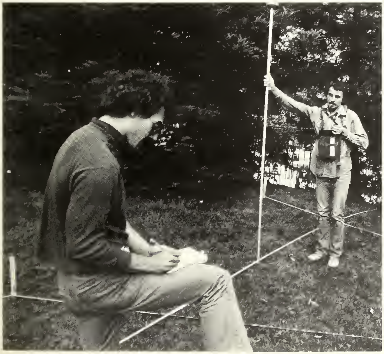


Figure 2.09: Beginning Excavation on a Portion of N-3. . . Construction crews drove sheet piles and broke the ground surface in readiness for the backhoe's work along N-3. For the first five feet of the excavation, archaeological monitors watching from the edge of the trench could easily hop in to record observations, and in this early stage they worked closely with the backhoe operator by using hand signals. (Robert M. Quan, WMP)

Figure 2.10: Remote Sensing Over the Buried Niantic. . . was carried out using a proton magnetometer. The Gold Rush vessel, whose remaining portions lie beneath a park next to the Transamerica Building (near Sansome and Clay streets), was chosen as a control site for comparison with the results from a magnetometer survey which was carried out over the whaling vessel **Lydia.** (Jack Prichett)

In the case of the N-5 dump site, the large quantity of artifacts exposed by excavation indicated that refuse dumping had comprised part of the 1880s filling activities at this spot. In this case, intensified monitoring made possible the gathering of a sizeable collection of bottles and ceramic ware, which formed the basis for the project's type collections (discussed in Chapters 6-11).

In the absence of controlled excavations, the acquisition of the archaeological collections from the dump site undoubtedly resulted in a skewed sample. Although archaeological monitors were instructed to collect a representative sample of all archaeological materials encountered, this was not always practically possible. Therefore, small and dark-colored artifacts are underrepresented, while larger, more visible objects--such as fragments of white stoneware plates and cuspidors--predominate. Organic materials--such as wax, leather, paper, and cloth--are also probably underrepresented, due to their relative fragility. In short, artifacts collected from the N-5 dump site and other locations within the Channel and North Shore outfalls form an enlightening but not fully representative collection of archaeological materials deposited in the context of nineteenth century landfill.

EXPERIMENTING WITH REMOTE SENSING DATA COLLECTION

Because of the possibility of encountering sunken hulks along the routes of the C-2, C-3, and N-3 sections, a feasibility study of two remote sensing techniques was undertaken in 1979. Using the documented hulk of the C-2 vessel as a basis for experimentation, archaeologists found that neither of the two remote sensing techniques tested were consistently capable of locating a sunken hulk within the confused context of waterfront landfill.

The use of a proton magnetometer, which reacts to the presence of large buried objects made of ferrous metal (such as the iron chainplates of a wooden sailing vessel), was ruled out for several reasons. High tension lines along the waterfront, both above and below ground, would introduce strong electrical interference which would detrimentally affect the experiment. As well, other large metal objects in the landfill, such as tangles of steel cable and sheet metal, might well result in similarly anomalous findings. Because the successful use of devices working on principles of resistivity (such as the proton magnetometer) depends upon the presence of distinct anomalies in an otherwise homogeneous soil horizon, the heterogeneous nature of the landfill along the San Francisco waterfront seemed to preclude the successful implementation of this kind of program. Finally, it was believed the high saltwater horizon in the tidal area immediately behind the seawall would raise soil conductivity to a point inhibiting detection of soil differences with the proton magnetometer (see Figure 2.10).

Remote sensing techniques utilizing seismicity or vibration rather than resistivity, however, are unhampered by a high saltwater horizon or by electrical interference. Accordingly, one such technique was considered in the feasibility study. Nevertheless, after considerable experimentation, the seismicity consultants concluded that seismic techniques were not sufficiently sensitive to distinguish the hull of a ship buried in the heterogeneous surroundings of waterfront landfill (see Chapter 4).

In short, remote sensing techniques, while hypothetically useful to historical archaeologists in urban settings, were not found to be sufficiently precise to replace mechanical exploratory borings and other more conventional methods for the location and identification of sunken hulks or other archaeological resources within the Channel and North Shore outfalls.

FILLING IN GAPS WITH ORAL HISTORY

Oral history--the collection of data about the past through interviews, verbal recollections of historical events, anecdotes, reminiscences, and oral accounts of toponymy--has long been a valued tool of historical and anthropological research (Gottschalk 1951, Langness 1965). In historical archaeological studies in general, and in the Wastewater Management archaeological program in particular, interviews with knowledgeable informants have helped illuminate several sorts of research problems. For example, informants may be able to provide specific details about the historical uses of a site being investigated. This was the case at the Southeast Treatment Plant in San Francisco, where conversations with the only surviving employee of the former Legallet Tannery provided insight into the accumulation of strikingly banded soil deposits near Evans Avenue (Olmsted et al., In Press). In other instances, informants may aid the archaeologist in reconstructing the placement of a particular feature at a site such as a privy or wharf, or may be able to explain anomalies encountered during field investigations.

Informants may also supply a wealth of detail concerning the class or ethnic composition of neighborhoods and social networks surrounding an archaeological site. This type of information was obtained in connection with the Southeast Treatment Plan historical study through interviews with Ted White, an elderly informant who had grown up in old Butchertown and remembered clearly the ethnic and social makeup of the neighborhood (Ibid.: 121-127). The acquisition of such background information is particularly relevant to historical archaeology today, as the field begins to examine these variables in relation to archaeological remains (Schuyler 1980).

Finally, interviews with the descendants of historical personages often result in the discovery of unpublished historical photographs and other important documentation. Recently, publicity about the archaeological investigation of a Gold Rush ship at Levi's Plaza in San Francisco resulted in a telephone call to the project's historical consultants from descendants of Frederick Griffing, the first owner of the lot at the corner of Battery and Filbert streets where the wooden vessel had been unearthed (Olmsted,

Olmsted and Pastron 1978: 42-44). At a subsequent interview, the Griffing family brought forth a previously unseen 1860s photograph of the Gold Rush warehouse built by their ancestor which showed the structure still fronted by a wharf on pilings. This photograph helped resolve previously unanswered questions concerning the precise sequence of filling at the site where the Gold Rush ship had been discovered. Likewise, in relation to the historical archaeological research at the Southeast Treatment Plant, an interview with Joseph Legallet, a descendant of the original owner of the Legallet Tannery, produced a photograph from the 1880s of the plant located on Jerrold Avenue, the only such photograph known to exist (Olmsted et al., In Press).

Oral documentation, like any historical source, is of course subject to bias. Its proper use depends upon judicious application of evaluative techniques for detecting discrepancies in the personal accounts. Vansina (1965), for instance, has detailed a variety of crosschecks to be applied to data obtained from oral history informants. These include measures of internal consistency and analysis of the social standing or credibility of the informant, as well as analysis of any relationships which might exist between the informant and the events being described. Utilized with these sorts of methodological constraints in mind, oral history may be reliably employed in the absence of, or as a supplement to, written documentation.

Accordingly, in the Wastewater Management Program, historical consultants made use of the testimony of Captain Fred Klebingat in compiling a record of the development of San Francisco's south waterfront (**San Francisco Waterfront:** 127-128 and passim). Klebingat was again consulted during the analysis of the section of the ship hulk removed from the C-2 site in 1978, since this vessel was apparently active at about the period when the venerable captain was himself sailing in and out of San Francisco (see Chapter 4).

Similarly, during the course of archaeological monitoring on C-4, it became clear that a succession of wharves had fronted the south side of Channel Creek. Interviews with a local restaurant owner and a houseboat resident succeeded in clarifying the history of the area during the 1930s and 1940s, enabling a distinction to be made between the remains of a more recent wharf and the pilings of the original Pacific Pine Lumber Company (**San Francisco Waterfront:** 96).

Thus, although the use of interviews with living informants played a minor role in the Wastewater Management archaeological program, oral history has proven great potential for yielding valuable data in historical archaeology, and the use of these techniques should always be considered where they are applicable.

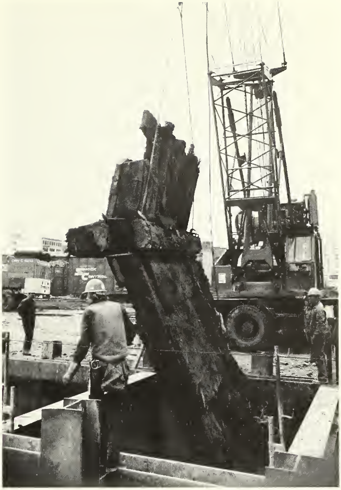


Figure 2.11: Removing a Section of the ***Lydia*****. . .** required nearly two days work and a large crane. Keel, keelson, lower ribs, hold, and hull planking were preserved intact in this segment of the vessel, which is similar to a section recovered from the storeship **Niantic** only a month earlier. (Jack Prichett)

Figure 2.12: Fitting Together the Pieces. . .of the artifacts found behind the seawall required many hours in the laboratory. Principal Investigator Allen Pastron directed the analysis of ceramic ware, bottles, and bone recovered along the route of sewer construction. (Jack Prichett)

MITIGATING ADVERSE IMPACT TO SIGNIFICANT RESOURCES

The principal aim of the waterfront archaeological program was to facilitate the mitigation of adverse impact to cultural resources of potential National Register eligibility encountered during the course of sewer excavation. As noted above, the discovery within C-2 of an intact wooden ship represented the single most significant archaeological find of the Channel or North Shore outfalls. Accordingly, upon discovery of the C-2 ship, the Prinicipal Investigator stopped sewer construction at the scene of the vessel while a team of archaeological and historical consultants excavated and examined the find in an attempt to assess its identity and significance. As a result, representatives of various governmental agencies decided that the entire section of the vessel exposed in the sewer trench would be removed and transported to a storage facility where further analysis could take place at a less frenetic pace (see Figure 2.11 and 2.12). This was accomplished in June 1978, and at this writing, it is housed at the Golden Gate National Recreation Area in San Francisco. Additional fieldwork was conducted on the C-2 ship in March 1980, when archaeologists and historians exposed another section of the vessel and studied it in situ. These combined investigations have resulted in conclusions and recommendations for additional archaeological and historical procedures to mitigate all adverse impacts to the portions of the vessel still in situ on either side of the C-2 sewer trench (see Chapter 4).

In contrast to the case of the C-2 ship, the Principal Investigator often found it possible to mitigate adverse impact to archaeological materials without interrupting construction activities. As previous studies have pointed out, archaeological resources have various levels of significance (Wirth Associates 1979a: 9). Some types found within the Channel and North Shore outfalls were clearly ineligible for inclusion in the National Register but were of interest nonetheless, for example, pilings and fragmented remains of wharves, or sections of old cobblestone streets. In such cases, the remains were simply recorded and photographed as they were exposed during excavation before their ultimate destruction by construction machinery.

ANALYZING AND PRESENTING DATA

This publication, **Behind the Seawall**, represents the culmination of the Wastewater Management Program's archaeological efforts in the Channel and North Shore outfalls. The data herein is based upon lengthy laboratory analysis and supplementary archival research which followed the conclusion of field investigations. Chapters are arranged topically, centering around the sites and research problems of major import. Chapter 3 discusses the landfill context of most of the archaeological program, while Chapter 4 is an account of the historical and archaeological investigations undertaken on the buried sailing ship discovered in C-2. Chapters 5 through 11 present the results of the recovery of archaeological materials at the N-5 site, with the first of these devoted to an in-depth discussion of the site itself. These chapters are organized around particular artifact classes found at N-5 and their relationship to late nineteenth century life in San Francisco and the western United States. Chapter 12, which concludes **Behind the Seawall**, summarizes the main findings of the Wastewater Management archaeological program and points to some of the larger implications which this work holds for other publicly funded urban construction projects.

In addition to the results presented in these pages, the archaeological materials recovered may, in themselves, invite future study by archaeologists and historians concerned with the development of the San Francisco waterfront in the latter half of the nineteenth century or with specific methodological and theoretical problems related to the deposition and content of waterfront landfill. To this end we have provided four appendices, containing primarily raw data and descriptions of artifact types, to supplement the analytical material in our chapters. Appendix A is devoted to the King Street Ship; Appendix B presents the collection of bottles found at N-5; Appendix C focuses on Chinese artifacts recovered at N-5; Appendix D summarizes and tabulates types of Euro-American ceramic ware found at N-5; and Appendix E is a report on seismic testing at the site of the ship buried on C-2, undertaken as a feasibility study of remote sensing methods.

The chapters, together with the appendices, comprise three volumes. The data they contain and the description of methods just recounted illustrate the workings of the new "archaeology in the city". Providing such an account may turn out to be one of the most important aspects of the wastewater archaeological program.

CHAPTER 3

MAKING LAND TO BUILD A CITY: LANDFILLING ON THE WATERFRONT

> 'Within another year one-half of the city will stand on soil wrested from the sea,' exclaimed the **San Francisco Courier** and **Sacramento Transcript** in October, 1850. Thus were overcome difficulties not unlike those encountered in placing St. Petersburg upon her delta, Amsterdam upon her marshes, and Venice upon her island cluster.
>
> Hubert Howe Bancroft, 1888

Surrounded on three sides by water and separated into almost isolated valleys by rugged hills and sand dunes, land-hungry San Franciscans began in the 1850s to expand their instant city out onto the flat tidelands. This they accomplished by blasting away a good part of Telegraph Hill to make a base for Front, Battery, and other new waterfront streets and by topping the sand dunes south of Market Street to support the growing Embarcadero. For good measure they also dumped their commercial and household refuse into the mix--mostly broken, worn out, empty, or outmoded items ranging from spittoons to porcelain dolls. In their haste to get on with business, they even occasionally entombed once-important wharves and wooden streets on pilings.

A century later, the Wastewater Management Program's test borings indicated and archaeological monitoring later confirmed what historical research for **San Francisco Waterfront** had predicted: the fill behind the seawall comprised an immense spectrum of soil types, in part because San Franciscans continued to fill along the waterfront for 70 years following the Gold Rush. Also contained in this mix were many sorts of rubble, debris, and refuse, as well as a small range of structural features such as wharves.

Recent excavation for construction of the sewer system unearthed very few surprises: a Gold Rush ship uncovered on King Street was the only major unanticipated find in the fill. Instead, in cases like the N-5 site, both borings and historical research had accurately predicted the presence of substantial concentrations of cultural refuse (**San Francisco Waterfront**: 439). Along the N-4 alignment, on the other hand, borings and monitoring also confirmed what archival research had suggested: that very little cultural material would be recovered even though the sewer ran through the former site of the Pan-Pacific Exposition of 1915 (**San Francisco Waterfront**: 686-689).

The following chapter on landfilling behind the seawall discusses (1) the soil components of the fill; (2) the various classes of cultural materials encountered during the course of the archaeological program; and (3) San Francisco's dumping practices and evolving patterns of waste disposal, activities which apply generally to other urban centers as well.

In selecting this format of presentation, data from test borings and on-site monitoring are not described on a strict alignment-by-alignment basis (e.g., C-1, C-2, etc.). While this kind of organization of the findings would neatly reflect the structure of the sewer construction program, it does not correspond to the reality of historical development or cultural deposition along the waterfront. For example, the northern end of C-3 and the southern end of N-3 have much more in common than the two extremities of C-3, areas which were filled decades apart. There are also cases in which different segments of the second seawall lie next to a single sewer alignment. The King Street ship, for example, was found opposite a point where two segments of the seawall meet, the two having been built several years apart. This called for careful historical investigation to specify the most probable sequence of filling around the ship (see Chapter 4).

ANALYZING THE SOIL COMPONENTS

Early in the test boring program for N-2, the least experienced member of the three-man archaeological team had a flash of insight when the second sequential boring encountered a layer of grey, sand-laden clay at a depth of 16 feet. "There must be a layer of this clay running at about this depth all along this part of the waterfront," he exclaimed, contemplating his field notebook. "Our last boring hit the same sand at this same depth!"

Leaning down from his seat high above the archaeologists, the drill rig operator, who had drilled as many holes in San Francisco streets as anyone around, smiled patronizingly. "That's a nice theory, buddy," he commented, "but it just don't hold any water. When you're diggin' in this fill, you can't say anything about what's 5 feet away, much less 20 feet away like these two borings. I've seen situations where two holes 10 feet apart were so different you'd think you were drilling in two different countries! If you think you've figured out what's down there after looking at these two holes, then you've got some surprises coming."

An analysis of soil and rock data collected along the sewer route quickly and indisputably confirms the truth of the driller's observation. Along the N-2 alignment alone, several dozen different soil types were encountered in the test borings which, with the exception of the three probes at the corner of Leavenworth and North Point streets, were placed exclusively in fill areas. The soil encountered ranged from an almost apple-green sand through a bright orange-yellow sand to an extremely dense blackish clay. Figures 3.01 and 3.02 show profiles for Borings #1 and 2, made some 80 feet apart on North Point Street near Powell, which illustrate the typical range of diversity of soil types encountered along the N-2 fill (Pastron 1979b: 10-11, 14-15). After the first two feet beneath the street surface, the two profiles are extremely different.

As part of the pre-construction preparations, a series of strictly geological borings was conducted for each alignment. One of the resultant soils reports on the N-2 area describes the diversity of the fill material:

> Fill material consists predominantly of very loose to loose, silty or clayey sand with rock and rubble fragments grading to loose, clayey or silty gravel. This fill is heterogeneous and, as indicated in our borings, large concentrations of rock and rubble may be expected at random locations along the

> alignment. From fill samples obtained during the subsurface explorations, it is estimated that gravel, rock and rubble fragments typically comprise 10 to 20 percent of the fill by volume, and fragments with diameters in excess of two inches comprise approximately 10 percent of the fill volume. The largest rubble fragment encountered during the subsurface exploration was approximately 12 inches in longest dimension (Dames and Moore 1977: 33-34).

Although geological data from the archaeological borings was not quantified in a manner which permitted comparison with the proportion estimates noted above, our geological observations agree completely with this overall characterization (Pastron 1979b).

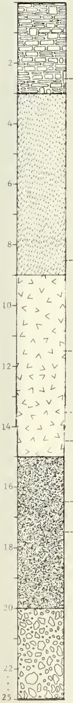
Local variations within the fill along the waterfront are pronounced, however. Archaeological test borings identical in method to the N-2 probes were carried out only a few blocks away at the Levi's Plaza development (see Map 1.02). There it was discovered that below a depth of about eight feet, the fill consisted virtually exclusively of large chunks of shale and sandstone blasted from Telegraph Hill during the 1850s. Most of the rock averaged from 4 to 6 inches in longest dimension, but many pieces were as large as 18 or 20 inches long (Pastron and Prichett 1979: 21-22).

Subsequent excavation for the basements of new buildings at Levi's Plaza made it clear that this bed of solid rock rubble extended over an entire two-block area. Barring definitive confirmation, however, caution should be exercised before diagnosing perceived "layers" of fill material on the basis of the profile resulting from a single test boring. What appears as a "layer" of yellow-brown clay or grey sand may be a purely localized concentration, which would be recorded as a "lens" if seen in the sidewall of an archaeological test trench. In a fill area, small and medium-sized concentrations of rock, sand, and clay overlap, abut, and fade out, forming a complex visual mosaic. A single probe may intersect a large number of such concentrations, and while it thus reveals the diversity of soil types present at any given spot, it cannot indicate their lateral extent. Hence, extreme caution must be exercised in attempting to extrapolate soil findings in landfill situations. Even where two adjacent borings would seem to indicate the presence of a continuous soil layer or layers, one must recognize the possibility of a discontinuity within this layer in the area between the test holes. The relationship between soil type and artifact content must also be treated carefully in mixed fill

N-2 ALIGNMENT

BORING #1
STATION #13 + 42 (35 feet north of the center of the N-2 alignment)
Located on the northwest corner of Powell and North Point Streets, 5 feet south and 5 feet east of the curb corner

DEPTH — COMPOSITION OF SOIL



Surface

Mixture of road rock fill and fine, gray/brown sandy soil

--- Traces of fine, moist, yellow/brown sand

Moist, yellow/brown sand with inclusions of gravel

--- Traces of gray sand appear at the bottom of the level

Heavy, gray/black clay with inclusions of medium sized shale-like rocks

--- Inclusions of shell and rock appear

--- Increase in amount of large, angular, shale-like rocks present

--- First traces of heavy, black bay mud appear

Black Bay Mud

--- Inclusions of gravel appear

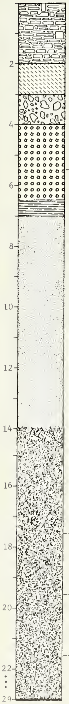
--- Inclusions of shell appear

Dense, dark gray, silty sand with inclusions of large, angular rocks

FIGURE 3.01

BORING #2
STATION #12 + 82 (49 feet north of the center of the N-2 alignment)
Located on the northeast corner of Powell and North Point Streets, 3 feet south and 10 feet east of the northeast corner of the curb at the intersection

DEPTH — COMPOSITION OF SOIL



Surface

Gray/brown, sandy soil with heavy inclusions of road gravel and broken brick

Mixture of dense, brown silty soil, gray sand, and brick fragments

Mixture of sand, gray/brown clay, gravel and large rocks

Dense, gray/brown clay with inclusions of large rocks and gravel

--- Pockets of dense, gray/green clay

Fine, gray sand

Gray, beach sand

Mixture of dark, brown/black, silty soil, sand and shell

--- Slight increase in amount of sand

--- Increased amount of gray sand and shell

--- Inclusions of fine, brown, organic material

FIGURE 3.02

Figures 3.01 and 3.02: Profiles from Two Adjacent Test Borings. . .along North Point Street (the N-2 alignment) illustrate the striking soil differences encountered in landfill deposits. These borings were located some 80 feet from each other. (Janice Narita Pastron)

situations, since the depositing of cultural materials and soil matrix may be independent of each other. Unlike the prehistoric midden or layer of refuse which archaeologists more commonly study, urban landfill may contain soil types and artifacts whose relationships are purely fortuitous.

While the majority of the soils encountered in both the test borings and the monitoring program consisted of landfill, natural formations were also observed. These included occasional occurrences of bedrock, the muds and silts of the original bay bottom, and at a few locations--where C-2 passed across the original Steamboat Point, for example--soils of the original land surface. Throughout the archaeological program, a handful of clearly recognizable soil types could also be discerned through their recurrent appearance.

Bay Mud

"Bay mud" is a term widely applied by construction personnel, engineers, and drill rig operators to the soil of the original bay bottom. Bay mud is usually an extremely dense, nearly black clay, sometimes laced with clam shell and traces of organic material. It emits a strong, somewhat unpleasant sulfurous odor and is generally devoid of cultural material. As the Dames and Moor soils report on the N-2 alignment notes, the composition of the natural bay bottom varied widely, ranging from fine to medium sand with only traces of silt, to silty sand, to highly plastic clay. The soils toward the plastic clay end of this continuum are what commonly bear the colloquial appellation "bay mud" (see Plates A 4A through A 4N of the 1977 Dames and Moore report for a detailed tabulation of grain-size distribution of the different soils of the bay bottom).

Archaeologically, the detection and recognition of bay mud was significant because its presence could generally be taken as an indication that a boring or excavation had reached the bottom of the artificial deposition. This interpretation, of course, was subject to reasonable congruence with historical data. Thus, if comparison of sounding depths on historical maps with present city grades indicated 20 feet of filling had taken place and if bay mud was encountered at 18 feet, it was judged that the bay mud represented the original bottom and that the two-foot discrepancy arose from some irregularity in the bay floor.

While articles lost or dumped into the bay could be lodged in the upper layers of the mud, it was generally assumed that the bay mud would be devoid of cultural content. In fact, this almost always proved to be the case. In conducting test borings, a five-foot penetration into black mud which produced no artifacts was taken as adequate evidence that testing could safely be abandoned. The principal exception to this assumption would be cases where dredged bay mud might have been used as a fill material, thus creating a mud layer overlying artifact-bearing fill. During the test borings program, careful attention was paid to the estimated depth of the original bay bottom to avoid being so misled, and in practice, the hypothetical dredged bay mud fill layer was never encountered in the Wastewater Management archaeological program.

Throughout the nineteenth century, the silting of the San Francisco Bay was a widely reported phenomenon (**San Francisco Waterfront:** 487-488), easily detectable in the changing water depths of the bay as recorded on various maps and charts. Along the waterfront, this silt layer lying immediately over the bottom bay mud and beneath the first deposition of fill was almost impossible to detect through archaeological borings or on-site monitoring observations, mainly because of its compositional similarity to the bay mud. After filling had occurred, the weight of the fill forced the silt down into the mud, making the two layers virtually indistinguishable as separate entities. The mixing of soil types caused by the action of the auger or "clam bucket" further clouded the differences in the case of test borings. While systematic hand excavation might reveal a gradual shading from fill through silt to original bay mud, the distinction was too fine to be made through the techniques employed by the Wastewater Management archaeological program.

Sandstone and Shale

The most clearly traceable and easily distinguishable geological fill component was broken rock quarried from Telegraph Hill (see Figure 3.03). The breaking up of the hill for bay fill purposes, beginning at the time of the Gold Rush, is well documented (Myrick 1972; Dow 1973:57).

Telegraph Hill is composed principally of the sandstone and shale of the Franciscan Formation. The most recent overview of San Francisco geology states:

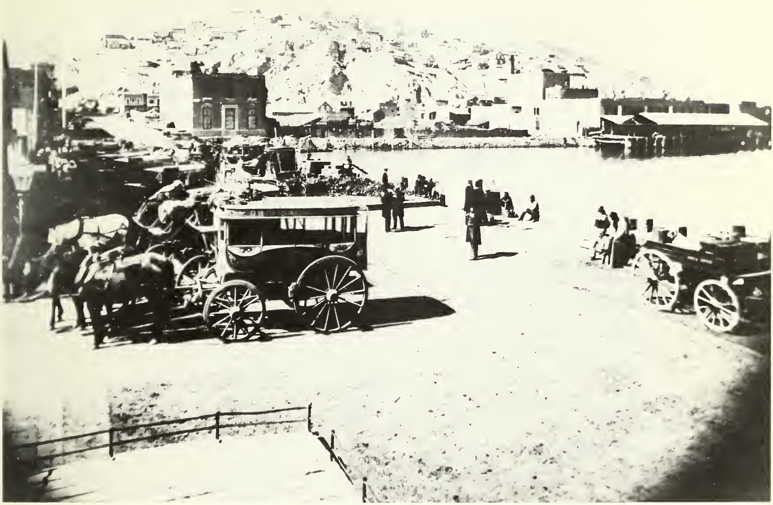


Figure 3.03: The Old Seawall c. 1868. . .shows one bend of the zigzag conformation which caused rapid shoaling near each right-angle corners. In this view from the Vallejo Street wharf, North Point is at the far right, hidden by dockside warehouses. The N-3 section intersected the line of the Vallejo Street wharf and cut through the landfill which replaced the water at right in the 1880s. Rock used in the seawall, seen along Front Street (center midground), came from Green Street quarry operators who reduced the east face of Telegraph Hill to the jagged shambles visible in the background. The hill also gave up rock for the construction of the city's larger second seawall. (National Maritime Museum at San Francisco)

> Classic rocks of the Franciscan Formation are the predominating bedrock in northeastern San Francisco. Russian, Nob, and Telegraph Hills consist of two sequences of massive sandstone and of two thick sequences of shale and thin-bedded sandstone. . . . The shale and sandstone sequence in turn overlies a lower massive sandstone 700 feet thick, exposed on the north side of Nob Hill and over most of Telegraph Hill (Schlocker 1974:16).

This sandstone is frequently encountered in the fill of the northeast waterfront, as for example in Borings #8, 9, and 10 of the N-3 alignment (Pastron 1978a), and it comprised the primary element in the early 1850s filling which established Battery Street and adjacent lots, as well as some of the fill near Sansome and Lombard (Pastron and Prichett 1979). Geologically, the sandstone of the Franciscan Formation is composed of " 'aggregates of sharply angular fragments of every size between sand or fine gravel and impalpable particles' (Williams et al. 1954). The grains are mostly angular and range in size from coarse sand to clay. The most common sandstone consists predominantly of fine to medium grains" (Schlocker 1974:18). In color, the sandstone of the Franciscan assemblage ranges from dark or medium gray when fresh, dark greenish gray or olive gray when weathered, to grayish orange when highly weathered. The last describes the form found along N-3 and the first-filled parts of Battery Street (Pastron 1978a; Pastron and Prichett 1979).

The shale of the Franciscan Formation shears easily; it is dark gray when fresh. Quantities of this rock, some in the decomposed form of gray-blue clay, were found during archaeological excavations of a Gold Rush ship in the blocks immediately behind N-3. The same shale was detected in Borings #5, 7, and 9 along N-2 (Pastron 1979b).

Bedrock for the North Shore sections of test areas was known to consist of the Franciscan Formation comprising Telegraph, Nob, and Russian hills. Along most of the North Shore and Channel outfalls segments, bedrock lay well below the level of excavations (see various pre-construction soils reports submitted to Wastewater Management Program). In one or two places, however, such as the intersection of Columbus Avenue and North Point Street and the section of North Point Street between Stockton Street and Grant Avenue, it was estimated that excavation would reach or approach bedrock level. Encountering bedrock would, of course, demarcate the archaeological baseline. Along the Channel segments, bedrock always lay far below the level of excavation.

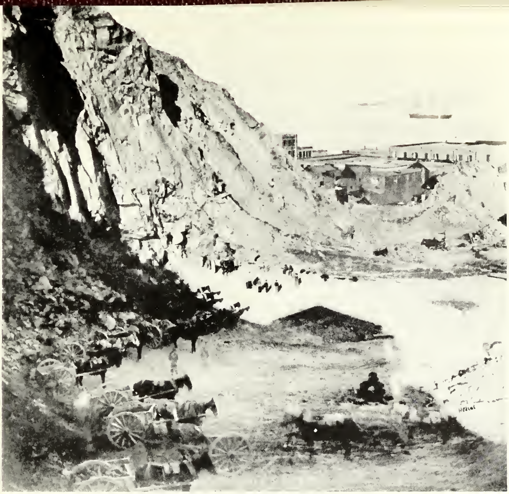
Dune Sand

The broad, flat expanse of large city blocks which form today's South of Market area of San Francisco was originally covered with immense sand dunes rising in height to more than 80 feet. As the city developed during the 1850s and 1860s, much effort was expended to level these dunes to make a flat, easily drained building surface. The unwanted sand was used for a variety of purposes, but principally as fill material. Hittell recalls the first unstable results:

> When streets were first made, the weight of the sand pressed the peat down so that the water stood where the surface was dry before. Sometimes the sand broke through, carrying the peat down under it, leaving nothing but water or thin mud near the surface. More than once a contractor had put on enough sand to raise the street to official grade, and gave notice to the City Engineer to inspect the work, but in the lapse of a day between the notice and inspection, the sand had sunk down six or eight feet; and when at last a permanent bottom had been reached, the heavy sand had crowded over the light peat at the sides of the street, and lifted it up eight or ten feet above its original level, in muddy ridges full of hideous cracks. Not only was the peat crowded up by the sand in this way, but it was also pushed sidewise, so that houses and fences built upon it were carried away from their original positions and tilted up at singular angles by the upheaval" (1878:433).

Immense amounts of dune sand found their way into the bay fill which was creating new streets and turning water lots into building lots on the city's eastern waterfront. In compiling the history of land alteration in the South of Market area, researchers Roger and Nancy Olmsted came across the following account of the activities of David Hewes and his celebrated "steam paddy" (see Figure 3.04), the prototype of the modern steam shovel. Hewes was commissioned to grade Market Street and other thoroughfares, a chore which he took on with enthusiasm. Hewes relates that:

> I commenced the work of grading Market Street at the corner of Third and Market, where a hill was nearly as high as the present Call Building, in the fall of 1858. I also proceeded on the same plan, with the work of grading Market Street and filling in water lots on the south side of Market from



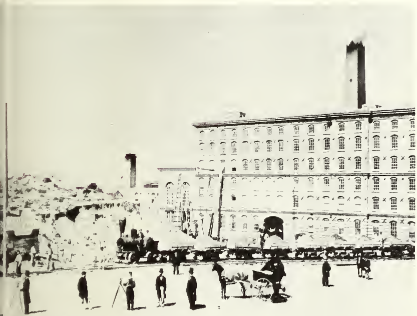


Figure 3.05: Quarrying at Telegraph Hill. . . Horse-drawn wagons by the dozens backed up to receive freshly blasted rock from Telegraph Hill, described by historian David Myrick as "the most widely disseminated hill on earth." Tens of thousands of cubic yards of its sandstone and shale were dumped annually into the bay or sent out on ships as ballast, incidentally undermining more than one house perched atop the hill. (Bancroft Library)

Figure 3.04: Leveling Hills to Make Bay Fill c. 1867. . . Sand for bay fill came from the city's seemingly inexhaustible dunes, and steam shovels such as this one belonging to David Hewes removed great portions of the South of Market hills. A small scale railway then carried away the sand to filling sites on the rapidly disappearing Mission Bay and Yerba Buena Cove. (California Historical Society)

> Fremont to Steuart, which was the east line of the bay south of Market Street. When this was done, I began filling in the Bay on the north side of Market Street from Battery down to East, taking the material from Market Street between Third and Fourth, and the sand hills between Market and Mission. When this was completed, I took up my track and laid it down on Fourth Street, from Market to King Street, filling Fourth and lots on the east and west side (Olmsted et al: In Press).

The reference in the middle of the account to filling "the north side of Market, from Battery down to East" is particularly tantalizing since it brings Hewes' work to within yards of the northern section of the C-3 alignment. Borings #12, 13, 14, and 15, located just to the east of the area described by Hewes, all encountered large concentration of fine gray-brown dune sand (Pastron 1978c). Dumped as fill after the construction of the second seawall, this sand was deposited well after Hewes had completed his leveling of the Market Street hill, but it represents a continuation of the same process of leveling sand hills in other parts of the rapidly expanding city. While sand from Hewes' steam paddy may have found its way into some locations traversed by N-3 or C-3, a careful engineering inquiry into the construction of Sections 1 and 2 of the seawall noted that for these works, sand was obtained largely from the "neighborhood of Black Point Military Reservation" (Hall et al. 1882:9).

Soils Summary

In all, a very wide variety of soil types and colors were encountered by the archeological test borings. As we have seen, some may be distinguished by origin, particularly when they appear unmixed with other soils. The dune sand, sandstone, and shale from Telegraph Hill are generally bereft of artifacts when compared with more mixed deposits, as may be seen by consulting the boring logs of the N-3 alignment (Pastron 1978a), where concentrations of dune sand and of sandstone appeared, and of the Levi's Plaza area (Pastron and Prichett 1979), which was filled mainly with sandstone. The more mixed N-2 fill was much heavier in artifact yield, as was the C-3 fill (Pastron 1979b; 1978c). In part this difference is attributable to chronological and historical factors, with N-2 and C-3 being filled long after N-3 (the deposit of earthquake rubble in the C-3 fill is discussed below). But the difference is also ascribable to the bulk handling of the sand and rock as fill materials. As we have seen, Hewes transported the sand from dune site to fill site directly via rail carts, and during the heyday of blasting on Telegraph Hill (see Figure 3.05), teams of horses and carts lined up to carry the freshly created talus directly to its new home in the bay (Myrick 1972). Both operations allowed little opportunity for artifacts to become embedded in the fill materials.

A far more diverse range of cultural detrita than soil and rock types found its way into the bay fill. By the time archaeological monitoring had been concluded, the cultural materials encountered extended from predictable samples of bottles, bones, and nails to unusual items such as Chinese temple tiles and porcelain dolls.

Within this diversity, however, the bulk of the artifacts fell into familiar categories. Features were far rarer than artifacts, and remains of many of the structures normally encountered in urban settings such as houses, sheds, and privy vaults were absent because the sewer route was placed under long-established street lines. The thorough map study carried out in **San Francisco Waterfront** showed that at only one or two spots had buildings existed in the path of the sewer construction. One of these was a tiny, square structure apparently supported on pilings which appears at the foot of Pacific Street on an 1877 California Harbor Commission map (**San Francisco Waterfront**: 483). This site was carefully monitored in September 1979, when N-3 excavation reached that point, but no evidence of the building was found. On the other hand, remains of many of the most common waterfront structures--wooden wharves--were encountered at several locations.

This section discusses the nature and placement first of features and then of artifacts within the landfill matrix, reserving a detailed historical account of the use and meaning of the individual artifact classes for the general discussion of the N-5 site (see Chapter 5). As will be seen below, distribution of artifact classes varied considerably by location along the waterfront.

Wharves

On the basis of the historical data for **San Francisco Waterfront**, it was predicted that the remains of a number of nineteenth- and early twentieth-century wharves would be encountered during the course of construction. In fact, for these reasons the course of the N-2 alignment was altered from the north to the south side of North Point between Mason and Taylor streets to avoid a buried wharf running the length of the street (**San**

Francisco Waterfront: 625). This engineering decision to avoid the problems which would result from attempting to bore a tunnel through a thicket of 12-inch pilings demonstrates one practical application of cultural resources investigations.

Along C-3, the south waterfront, the remains of several wharves were anticipated (**San Francisco Waterfront:** 241-242 passim). This alignment also followed Steuart Street for several blocks, a street which historical research indicated had been a piling-supported wooden surface from Gold Rush days through the 1880s (Ibid.: 309). Because Steuart Street had been used continually throughout the long City Building period and because a wide range of activities was represented along the street-wharf, this segment of excavation was targeted for intensive monitoring. Two critical factors tempered optimism about artifactual recovery, however. One was knowledge of the constant dredging which went on around wharves during the nineteenth century (Ibid.: 416), an activity which would have removed most of the cultural deposit. The other was the fact that the planned excavation depth was not deep enough to reach the original bay bottom where early Gold Rush remains, or any unexpected Mexican- or Spanish-period remains might lie. With these caveats, careful monitoring was undertaken to determine whether or not any historical sequence could be observed in the deposits beneath the wharf or whether exceedingly rich cultural deposits had accumulated as a result of dumping or accidental loss from the commercial enterprises located on Steuart Street.

Remains of the old Steuart Street were observed in the form of pilings and pieces of planking which evidently had been ripped up and thrown into the fill when the street was filled in the 1880s. The pilings, measuring 12 inches in diameter, were made of Douglas fir. Lying some six feet beneath the present street surface, the planks were broken and lying at odd angles to each other when they were uncovered by excavation. Artifacts from beneath the wharf suggested an association with the filling in the 1880s; the earlier layers of cultural deposition, if they exist intact, still lie below the level reached by excavation for the sewer.

Wharf pilings without decking were also observed by the monitor on C-3. Their location confirmed them to be the remains of the wharf complex which formerly existed at the foot of Bryant and Spear streets,

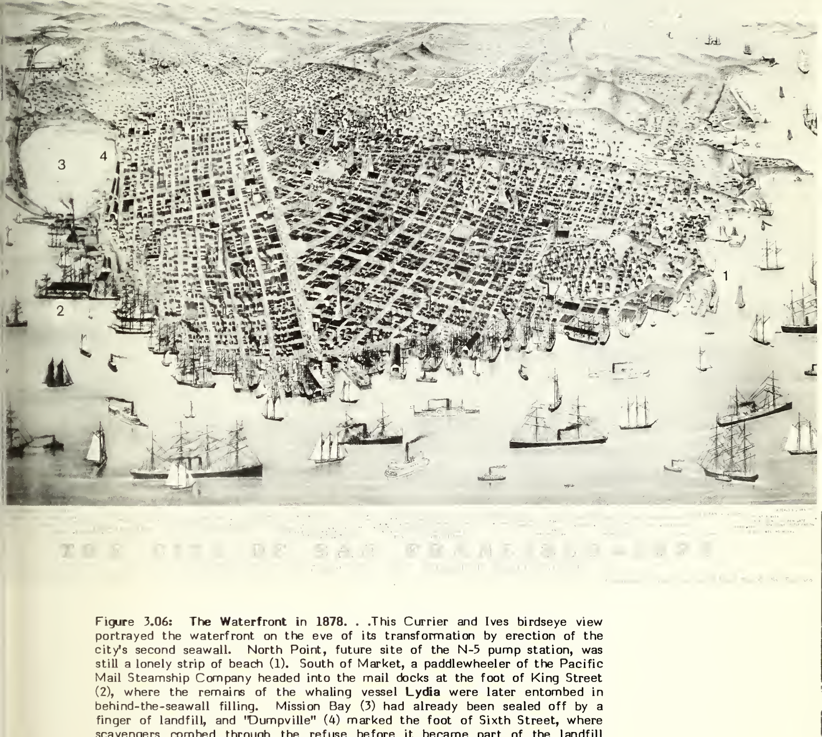

3
4
2
1
THE CITY OF SAN FRANCISCO

Figure 3.06: **The Waterfront in 1878.** . .This Currier and Ives birdseye view portrayed the waterfront on the eve of its transformation by erection of the city's second seawall. North Point, future site of the N-5 pump station, was still a lonely strip of beach (1). South of Market, a paddlewheeler of the Pacific Mail Steamship Company headed into the mail docks at the foot of King Street (2), where the remains of the whaling vessel **Lydia** were later entombed in behind-the-seawall filling. Mission Bay (3) had already been sealed off by a finger of landfill, and "Dumpville" (4) marked the foot of Sixth Street, where scavengers combed through the refuse before it became part of the landfill which finally obliterated Mission Bay. (New York Public Library)

and, again, the decking had been removed when filling occurred (**San Francisco Waterfront**: 347). Similarly, pilings from the old Pacific Street wharf were observed during monitoring on N-3. Archaeological investigations of a Gold Rush ship buried under a pier at the Levi's Plaza site also revealed that much of the decking of that wharf had been removed, probably to allow it to be filled at a later date (Olmsted, Olmsted, and Prichett 1980).

Historical photographs reveal that nineteenth-century wharves in San Francisco were constructed in a standard piling-and-stringer fashion. While extensive details of construction might have been usefully recorded, the fact that the decking and stringers were often disturbed from filling activities, coupled with the disturbance caused by the sewer excavation and the impossibility of obtaining careful exposure, meant that little chance existed to formulate a careful reconstruction. Evidence accumulated during the monitoring showed that wharf pilings were generally of Douglas fir or redwood and the surface planking of fir.

Ship Hulks

Sailing ships found their way into the waterfront fill in various manners. **San Francisco Waterfront** carefully traced the archival record of wooden sailing vessels known to have been buried under the advancing city front, noting that in some instances they were deliberately beached and utilized as storeships or hotels. This was the case for the **Niantic**, a famous Gold Rush storeship whose upper portions burned in a fire in 1851 and whose lower portions below the water line were soon buried under landfill (Delgado 1980). Other vessels were scuttled in attempts to establish property rights on water lots, and one colorful incident reported in **San Francisco Waterfront** concerns the exploits of Captain Fred Lawson, who sank four vessels (the **Noble**, the **Hardy**, the **Inez**, and the **Bethel**) for this purpose. Though his vessels might conceivably have been encountered during excavation of N-3, historical sources suggested strongly that the hulks did not lie within the course of the sewer (**San Francisco Waterfront**: 447-456). Finally, the waterfront might hold the remains of ships which burned while riding at anchor and lay forgotten along portions of alignments where water had originally been several fathoms deep. Although this possibility seemed slight, much of the harbor had seen heavy maritime traffic, and it could not be ruled out entirely. In fact, this was one of the main reasons for the establishment of the monitoring program.

As already indicated, one unanticipated hulk was encountered at the eastern end of the C-2 alignment. Because of its significance, it receives extensive treatment in Chapter 4.

Artifacts

For the most part, the artifacts recovered from the waterfront landfill consist of the small, the broken, and the discarded. The main exception to this categorization are the items unearthed at the N-5 dump site (see Chapter 5) and Dumpville (see below). The vast majority of artifacts fall into classes common to urban contexts: bits of window and bottle glass, nails, wire, and bone, together with occasional buttons, insulators, and other commonly lost or discarded items. However, the collection includes no paper, very few bits of textile, no wax, and only occasional organic or vegetable remains. Along N-4, at the site of the Pan-Pacific Exposition of 1915, monitors recovered remnants of some of the building facades, imitation colonades, and pedestals of the stucco material dubbed "imitation travertine" (San **Francisco Waterfront**: 691). Some of the refuse along the waterfront had found its way into the fill as dumped garbage (discussed below), while along C-3 some cultural material had obviously been dumped with the earthenware and fire rubble from 1906.

Distribution of artifacts followed regular patterns both within and between alignments. The depth of their distribution was obviously bounded at the lower limit by one of two factors: the depth of excavation required by sewer construction or penetration by the test borings into the culturally sterile bay bottom or native soils over Steamboat Point on C-2.

Visible throughout much of the course of excavation was a bipartite layering of the fill materials. While variations existed in the pattern, the stratification was regular enough to be predictable, being observed at dozens of locations.

The upper or "Roadbed Horizon" consists of a few feet of brown, sandy loam, heavily laced with red brick chips, railroad gravel, and small red rock from 1/2 inch to one inch in size. Mixed in are other artifacts, predominantly bits of window and bottle glass, ceramic sherds, wood scrap,

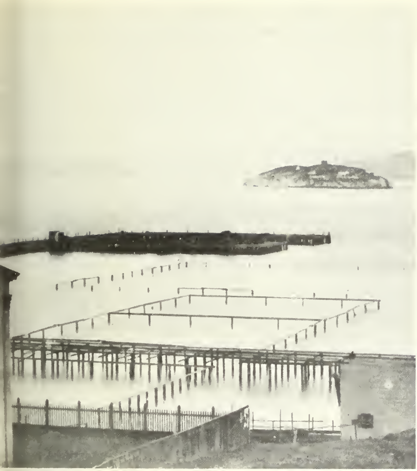
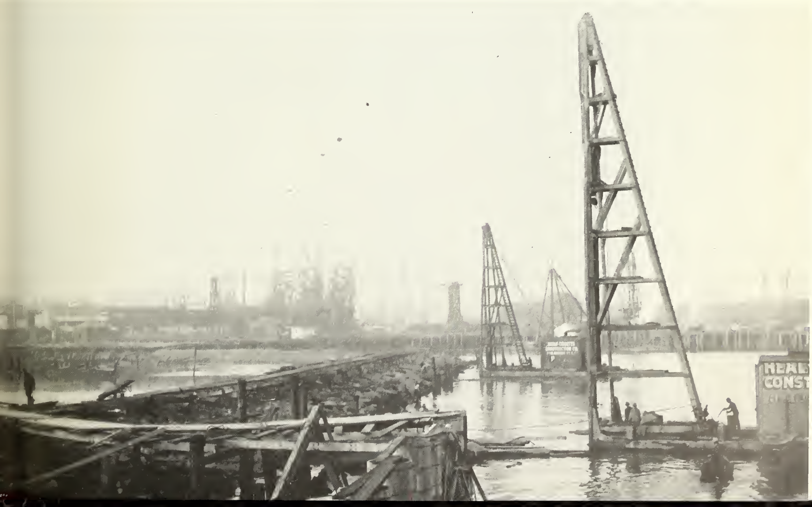


Figure 3.08: Meiggs' Wharf and North Beach, 1856. . . .The distinctive dark claw of Meiggs' Wharf extended just beyond the shallows which marked North Beach in this view by photographer Fardon. By 1856, however, Meiggs' grandiose plans to develop the north waterfront had already crashed, and the water lots marked with pilings were but ironic reminders of one more failed scheme. In the foreground, Bay Street had been piled and capped, but the more distant lots fronting on North Point Street (site of N-2) went unfilled until the 1880s. (Bancroft Library)

Figure 3.07: Building the Seawall South of Market, 1908. . . .Rock riprap to bind the face of the new seawall marked this view of seawall construction near the foot of King Street. In the foreground are the cylindrical forms for concrete pilings which support present-day Pier 42. Enclosed in the soon-to-be-filled lagoon behind the new wall are the pilings—minus their decking and superstructures--of the old Pacific Mail docks. The remains of these wharves were discovered during sewer construction along C-3. (Society of California Pioneers)



and nails. These run the gamut from fragments of obviously recent liquor and beer bottles to fragments of kaolin clay smoking pipes and bottles with hand-applied lips dating to the nineteenth or very early twentieth century. The chronological mixing results no doubt from deposition of artifacts and disturbance of layers of top soil during periodic street resurfacing or the myriad street excavations made for maintenance or installation of sewer, water, electrical, gas, and telephone lines. The constant appearance of the gravel results from roadbed construction with a layer of gravel sometimes lying immediately underneath the street paving.

The depth of this upper layer of loam and artifacts varied anywhere from 1-1/2 to 11 feet below the surface. Generally, the artifact content was sprinkled sparsely throughout, with densities being sparser than in the fill material lying below (see Table 3.01).

The second horizon appearing regularly in the fill consists of a heterogeneous mix of the various soils described above--various colored sands, clays, and rock. In this horizon, the variation in soils is pronounced, with some borings producing as many as seven different soil types (for example, Borings #6 and 7 on N-2), with others containing only two (Boring #8 on N-3). It is in this lower horizon of the fill that the greatest artifact densities are found. The numbers and percentages of artifacts discovered in the two fill horizons of Borings #1-8 at the N-2 alignment are compared in the following table:

TABLE 3.01

Distribution of Artifacts in Fill Horizons at N-2[a]

Boring #	Roadbed Horizon		Lower Horizon		
1	b		75	(100%)	
2	b		17	(100%)	
3	6	(1%)	499	(99%)	
4	56	(29%)	134	(71%)	
5	36	(46%)	42	(54%)	
6	55	(5%)	941	(95%)	
7	54	(8%)	640	(92%)	
8	30	(8%)	354	(92%)	
Total	237		2702		(N=2939)

NOTES:

a. Borings #9, 10, and 11 of the N-2 testing program are not considered because they were made over the original shoreline, not the fill.

b. Red brick and gravel recorded in notes and boring log, but not counted.

Below the "Roadbed Horizon", layers of dune sand or large angular rock are often found, as discussed above. In areas where they were quarried, then dumped directly as part of the waterfront fill, these deposits tend to be nearly sterile of cultural materials. Where deposited as only one part of a variety of filling activities, however, these matrices tend to contain approximately the same proportion of artifacts as other types of soil. This was confirmed by an analysis carried out on borings along N-2 and N-3, the results of which are presented in Table 3.02. It should be pointed out, however, that in some cases (for instance, N-3 Borings #6 and #7 and N-2 Boring #2), the absolute number of artifacts was very small, suggesting again that sand fill is more likely to be relatively artifact-free.

In compiling Table 3.02, "sand layers" were those in which sand was the predominant matrix. Soil layers, where sand was described as a minor component (e.g., brown sandy soil), were not included as "sand layers". The same definition was used for selecting "rock layers" for analysis. "Rock layers" were entirely sterile in the borings where they were found. The 10½'-16' levels of N-2 Boring #4 were sand, containing much large rock. Yet, they were heavily laden with artifacts. No simple explanation is apparent for this anomaly. The sand layer appearing immediately below the rock in this boring was heavily soaked with oil, as was the rock itself and the soil slightly above it. Perhaps the rock was part of the fill surrounding an underground oil storage tank. The depths of the rock layer are appropriate for the depths at which such a storage tank might be placed, and the rock layer is higher than any others in N-2 and N-3. In the other two alignments, many of the rock layers extend nearly or fully down to the mud of the original bay bottom, suggesting that they were the initial fill layers.

Layers containing the most artifacts were normally a blackish, clayey soil imbued with a slightly sulfurous odor and containing discernable amounts of organic material, the most frequent being decomposing straw. The sulfurous scent probably derived from decomposed stable sweepings and vegetable products.

The distribution of artifacts varied spatially as well as vertically, and two particular trends were noted. Along N-2, N-3, and N-5, sections of the city front developed between the 1870s and the turn of the century

TABLE 3.02

Distribution of Artifacts in Sand and Shale/Sandstone Fill Layers

Boring	Total Depth of Boring	Sand Layers	% of Total Artifacts	Large Rock Layers	% of Total Artifacts
N-2 #1 (N=75)	25'	---	---	20'-25'[d]	0
N-2 #2 (N=17)	29'	6½'-14'	29%	none	----
N-2 #3 (N=505)	26'	17'-26'	.2%	none	----
N-2 #4 (N=190)	26'	17'-19'[a]	5%	10½'-16'[d]	67%
N-2 #5 (N=78)	30'	none	----	none	----
N-2 #6 (N=996)	25'	none	----	none	----
Total 1861					
N-3 #2 (N=69)	35'	3'-23'[b]	54%	none	----
N-3 #4 (N-39)	32'	10'-16'	0	30'-32'	0
N-3 #6 (N=14)	30'	7'-24'[c]	60%	none	----
N-3 #7 (N=15)	30'	6½'-30'	13%	none	----
N-3 #8 (N=14)	25'	----	----	15'-25'	0
N-3 #9 (N=27)	30'	----	----	18'-30'	0
N-3 #10 (N=20)	23'	----	----	16'-23'	0
Total 198					

NOTES:

a. Fine, black, silty sand with traces of oil (very little rock present)

b. 3'-9' with occasional small pieces of gravel

c. 19'-24' silty

d. With inclusions of large angular rocks (see Figure 3.06), the greatest artifact concentrations are found in fill material some distance behind the seawall, rather than in zones close to the cement lip marking the city front. This becomes apparent once data from several locations are contrasted.

Using the borings from Tables 3.01 and 3.02 for comparison, we can see that the eight N-2 borings produced a total of 2939 artifacts, or an average of 367 per hole, with four of the holes producing more than 300 artifacts each. The seven N-3 flight auger borings, by contrast, yielded only 198 artifacts in toto, or an average of 28 per hole. Allowing even for the fact that the upper portions of the N-2 borings were conducted with a 30-inch auger rather than a 24-inch auger (although, for the most part these levels were in the low-yield roadbed horizon), it is clear that there is a tenfold difference in the order of magnitude in the artifact yield between the two alignments. This difference corresponds to relative proximity of the test boring to the city front. Whereas all seven of the N-3 borings were located along the Embarcadero only 200 feet or less from the water's edge, the N-2 borings were along North Point Street, all two blocks or more from the seawall.

The increase in artifact density may also be observed within N-3 itself. Test borings using an 18-inch auger were conducted at the Levi's Plaza site on the western portion of the block bounded by Union, Filbert, Battery, and Front streets, immediately inland from the course of N-3 (see Map 1.02). (In fact, at the time the Levi's borings were conducted, construction activity at N-3 was visible from the site.) The Levi's borings were some 300 feet west of N-3 Borings #5 and 6.

Since the principal objective of the test probe at the Levi's site was the detection of buried ship hulks, a complete artifact collection was not made, as had been the case with the Wastewater Management borings, nor were artifacts systematically sorted, described, and cataloged. Nonetheless, because the Principal Investigator directed the borings at Levi's Plaza as well as N-2 and N-3, a qualitative, if not quantitative, comparison may be made.

Borings #2, 3 and 4 on Levi's Block C encountered the same dark brown, sandy, trash-ridden soil matrix as found along N-2 and N-5. In the upper layers of these borings, the ash and brick of the 1906 fire devastation was unmistakeable. Several feet below the burn layer were the refuse deposits which date from the 1860s filling of the northwest portion of the block. In a partial sampling, some 432 artifacts were collected from the three Levi's test holes. Window glass and fragments of the white "Ironstone" ceramic ware typical of the 1880s appeared by the scores in each one-foot level, but most of them were discarded after being recorded in the field notes. If all the fragments had been saved, it is estimated that artifact densities equivalent to, or surpassing, the N-2 results would have been obtained (Pastron and Prichett 1979: 82-86). In any case, the dramatic contrast in artifact yield between N-3 Borings #5 and 6 and the Levi's borings to the east also suggests that refuse remains increase as one moves inland in the seawall fill.

The same generalization holds true within the N-5 dump site where most remains were found in the southwest corner of the construction site (see Chapter 5). Artifact concentrations diminished rapidly toward the bay in the northeastern quadrant of the site, and test borings along the extreme end of North Point Street confirmed the presence of totally sterile sand fill just to the north of the N-5 boundaries.

Taken as a whole, then, the data from N-2, N-3, N-5, and Levi's Plaza indicate that in the North Beach section of San Francisco and along N-3, the post-seawall fill is much more likely to contain heavy artifact deposits beyond the 200-foot right-of-way strip established for the Embarcadero. This finding is not totally unexpected. In examining the contracts for seawall construction let by the state harbor commission, Roger and Nancy Olmsted observed that the conditions of the contract for each section specified that work included bringing up to grade the full 200-foot right-of-way established for the Embarcadero. While the specifications did not specifically state that fill covering the landward slope of the seawall and creating the Embarcadero roadbed had to be "clean", it seems likely that contractors--eager to finish their job--would contract for importation of large quantities of fill material to be brought in and poured via the tramways and cart roads built for the task. One convenient source of abundant fill material was offered by the city's sand dunes which were being leveled throughout the late nineteenth century. The slower, less reliable process of filling via refuse dumping contracted with dozens of small-scale scavengers would probably have been inefficient for the task of completing a seawall segment. Filling of individual water lots, however (see Figure 3.08), or even street lines (such as that of North Point Street), where there was less immediate pressure to complete the task, could be completed at a more leisurely and less costly pace. Behind the 200-foot right-of-way of the Embarcadero, therefore, filling apparently took place on a different basis. The differences between the two processes appear to be reflected noticeably in the data from the N-2 and N-3 test borings.

Bone

In prehistoric archaeology, recovered faunal remains are scrutinized to gain insight into the hunting and dietary practices of the aboriginal inhabitants of a site. In historic archaeology, the great amount of information generally available concerning food habits and food preparation practices reduces the need to infer diet from archaeological remains. For nineteenth-century San Francisco, for instance, archival resources available to the researcher include meat cutting manuals, restaurant bills of fare, and historical photographs of butcher shops, stores, and even dinner tables. The main emphasis in faunal studies of historic sites has been butchering practices as they change over time and the question of whether ethnic identity may be discerned archaeologically from the cuts of meat predominantly used at ethnically identified locations. Analysis focuses on the shape of the bone remnants and the type of preferred butchering implements as deduced from the saw, knife, or break marks on the bones (Gust 1980; Schulz et al. 1980; Walker 1980). To date, results have been inconclusive, although bone refuse from Chinese sites may generally be distinguished from Euro-American faunal remains (Walker 1980).

This chapter section examines the sample of 205 animal bones recovered from the N-2 test boring program. The bone samples obtained through borings placed in the landfill bear no association with definable archaeological features, and given the fact that they were placed in the fill at the different boring locations over a period of years, it may be safely assumed that they do not represent remains from a single deposition. Hence, an attempt to trace ethnic differences through the sample would be of no avail. Nonetheless, certain aspects of the faunal remains--the variety of animals represented, for instance--may offer some insight into landfilling practices.

The following analysis of the N-2 bone was conducted by Dr. George R. Miller and his associates at the Institute of Cultural Resources of the Department of Anthropology at California State University, Hayward (see Figure 3.09). The results of their analysis, together with a full array of the raw data, appeared in the report on testing for the N-2 alignment (Miller et al. 1979). Because that document received limited circulation, however, the central portion of the findings is reproduced verbatim below.

> The N-2 sample is composed of 205 animal bones representing an essentially modern, domestic fauna, not unlike the fauna that one would expect to find in a contemporary Chinatown dump. These animals include cow, pig, sheep and/or goat, chicken, turkey, rabbit, turtle and a number of bones too fragmentary to be identified more specifically than mammal, fish, or bird.
>
> Due to the nature of the excavation no attempt was made to determine minimum numbers of individuals. Instead, the relative abundance of different animal taxa was estimated by the "number of fragments method" and the "weight of dry bone method". Both of these methods demonstrate the relative importance of beef over other types of meat at the site. However, due to the great differences in body weight between **Bos taurus** (cow) and smaller species such as **Gallus domesticus** (chicken), we believe the "weight of dry bone method" to provide a more accurate picture of the relative importance of species. This method indicates that over 60% of the osteological remains found at N-2 were beef bones with some 16% sheep/goat, 15% pig, and 2% chicken. It is interesting to note that the bones and carapace of several turtles were found at N-2 and may be the remains of turtle soup.
>
> Procedure
>
> Identification of each bone from N-2 was made by comparison with specimens from the osteology reference collections in the Department of Anthropology, California State University, Hayward and/or the Museum of Vertebrate Zoology, University of California, Berkeley. The following information was recorded for each bone and corresponds to the order of columns in the faunal inventory: 1) catalogue number (includes the boring number as well as a serial number), 2) the level number in feet below the surface (e.g., level number 11 indicates that the specimen was obtained between 11 and 12 feet below the surface), 3) taxon (species when possible, a more general taxonomic category when not), 4) side (right, left), 5) portion (e.g., proximal), 6) bone element (e.g., humerus), 7) weight in grams, 8) state of fusion, 9) butchery pattern (fracture and/or saw marks), 10) remarks. (A complete listing of these data is provided in Appendix 1--Faunal Inventory--in Pastron 1979b.)

Slaughtering Practices

The age at which meat animals are killed has been used by zoo-archaeologists to demonstrate differences in hunting strategies or management practices between species. A particularly successful example of this type of analysis was performed by Raymond Chaplin on the Treasury Site, an Iron Age farm site in Britain. The domesticated cattle, sheep and pigs at this site were found to have been slaughtered according to three quite distinct schedules, corresponding to their growth rates and periods of prime meat yield.

Unfortunately the N-2 sample is too small to be used in similar analysis. However, the state of fusion of each long bone was recorded and could be incorporated into data obtained through some future excavation.

Differential Representation of Body Parts

We were curious to know if a preference for any particular cuts of meat could be demonstrated between the three species of large mammals (cattle, sheep/goat, pig). Such a preference might be reflected, for instance, in a disproportionate representation of pig ribs over all other pig bones. The small sample size was again an obstacle to this type of analysis. We can only point out the fact that pig is the only species represented by maxillary and mandibular fragments. This may correspond to the historic use of this animal for "head cheese". In addition, the general lack of head elements most probably indicates that the animals were processed within the context of a modern butchery marketing system in which slaughtering and evisceration took place on country farms and headless carcasses were transported to city butcher shops.

Saw/Fracture Patterns

The modern character of this fauna is also reflected in the methods used to cut the carcass into manageable joints of meat; 61% of the cattle, pig, sheep/goat bones show clear evidence of having been sawed. The remaining bones are fractured and some show percussion spalls such as would be produced by an axe. The saw marks are quite even parallel striations and give the impression of having been produced by a mechanical band saw. That a band saw and not a hand saw was used remains to be experimentally tested; however, if proven true, this fact would provide another important datum in dating these historic remains.

The cuts of meat represented by the cattle, pig and sheep/goat bones are highly suggestive of the cuts found in the butcher shop today. Numerous narrow sections of beef, pork and lamb bones were encountered which appear to be the remains of steaks and chops. Other larger bones may represent soup or stew bones. In general, no cuts were found which do not possess modern counterparts. The only aspect of the N-2 bones which would distinguish them from the bone refuse of a 1978 Bay Area dump is a higher frequency of percussion fracture.

Some 92 percent of the bone fragments found in the landfill were identified to the genus level. Of this sample, all the bone--butchered or unbutchered--appears to be from animals used as food. This conclusion is based on the fact that none of the bone is derived from animal species commonly used for other purposes, such as cats, dogs, or horses. Although the sample is not large, the results suggest that the overwhelming majority of the bone found in the fill resulted from household or restaurant food refuse, rather than from the disposal of carcasses. The implications of this suggestion will be examined at greater length in the concluding section of this chapter which deals with waste disposal practices in general.

As for observation on cultural food practices, this limited analysis shows that of all meat types beef was overwhelmingly the best represented, being present in four times the quantities of either sheep and goat or pork. To infer a preference for beef over other meat types, however, would require a far more sensitive sampling design than that employed in the test boring program. In addition, historical research concerning relative prices of beef, pork, and other meats would have to be explored, as would a consideration of meat production practices. Nonetheless, assuming that the boring data represent a random sampling of fill artifacts, the preponderence of beef bone suggests lines of possible inquiry.

A second point to be noted concerning the bone remains is that about 88 percent of the total sample was retrieved from depths between 5 and 16 feet below surface, which places the bone as part of the original fill layer rather than as part of the "Roadbed Horizon". It may thus safely be assumed that the bone represents refuse deposited in the 1880s and 1890s when filling took place along N-2.

Artifacts Compared by Sites

As observed earlier, construction of the seawall and the filling behind it generally took place south of Market Street some two decades later than the filling along N-2 and N-3 to the north (see Figure 3.10). Since much of the South of Market filling post-dated 1906, it was anticipated that rubble and debris from the Great Fire would be encountered along C-3 and parts of C-2 (see Figure 3.11).

On city blocks devastated by the fire, the resulting layer of ruins is an unmistakeable black slash in the soil, usually visible about 12 inches below the present-day ground surface (see Figure 2.04). In the monitoring situation, however, the disruption caused by heavy excavation equipment and the use of sheet pilings along the trench walls made observation of stratigraphic layers nearly impossible. Consequently, to test whether in fact there were differences between fill north and south of Market Street, data from the test borings were sorted into five categories and tabulated. These categories were: (1) building materials; (2) food ware; (3) bone; (4) clothing; and (5) miscellaneous materials. For this analysis, the relative proportions of building materials to food ware was the crucial factor, because a preponderance of building materials in the C-3 and C-2 South of Market fill would favor the hypothesis that the South of Market landfill was largely earthquake rubble.

The following guidelines were applied in classifying artifacts into one of the five categories. "Building materials" denoted all artifacts determined to be typical construction materials or those clearly assignable to an architectural or industrial use. This included all wood fragments, bricks, nails, bolts, wire, ceramic tiles and insulators, machinery parts, and plate glass. Metal scraps too small or too corroded to identify as to function were classed under "miscellaneous". "Food ware" included all bottle glass and all sherds from ceramic plates, cups, bowls, and other table ware. Bottle glass and ceramic sherds comprised the vast majority of this category, but occasional pieces of silverware and other items were also encountered. "Bone" included both butchered and unbutchered pieces, with most specimens determined to be of two types: ungulate (beef) or avian (fowl). Bone artifacts such as buttons, however, were classed under "clothing", which was comprised of buttons, buckles, or items of personal adornment such as jewelry or watch parts. In the artifact inventories there occurred a few textile scraps, but since they could not be positively identified as clothing, they were classed under "miscellaneous". This last category included all artifacts either not positively identified (miscellaneous metal fragments, clinkers, glass not assignable as either window or bottle, and leather scraps) or items without another appropriate category (e.g. safety pins, seeds, harness parts).

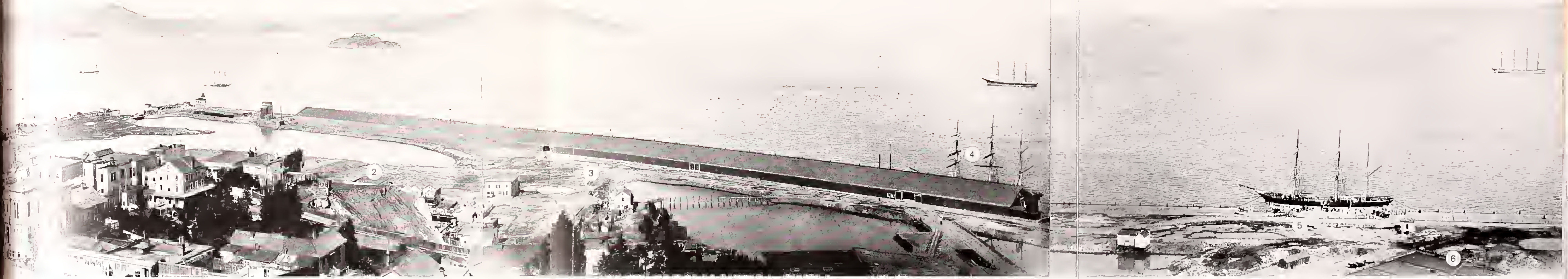


Figure 3.10: North Waterfront Panorama, 1883. . . .The camera's sweep recorded the progress of seawall construction and filling along the foot of Telegraph Hill in 1883. Filling had been completed along Mason Street (1) to the present city front, with a tongue of fill protruding eastward into the large lagoon. The Dupont Street canal had been filled (2), and Kearny Street had been brought to grade (3), though a large unfilled pond remained immediately to the east. Near the east end of the long grain storage shed (4), one bark waited for a load of "valley gold", while another prepared to take on cargo at the foot of Sansome Street (5). With its roof just protruding into the frame, the Lombard Warehouse (6), part of the waterfront's "warehouse row" throughout the late 1850s, '60s, and '70s, had now been permanently landlocked (see Figures 1.05 and 1.06). (Wells Fargo History Room)

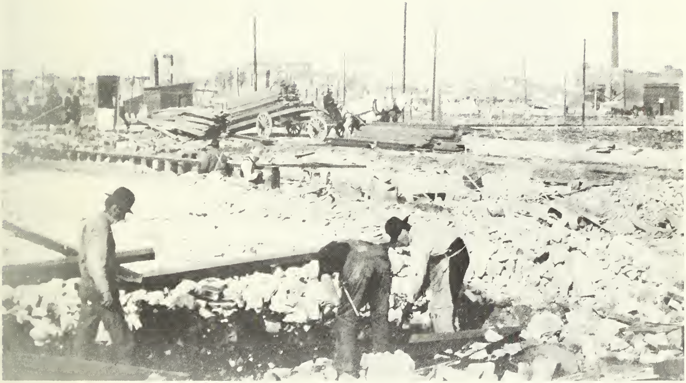


Figure 3.11: Clean-Up After the Earthquake of '06. . .provided immense quantities of rubble fill for landmaking behind the South of Market sections of the second seawall. While hundreds of carts were kept busy bringing lumber and other building supplies to cleared sites, others wended their way down thoroughfares such as Fourth Street to dump the ruins of the city into the bay. (California Historical Society)

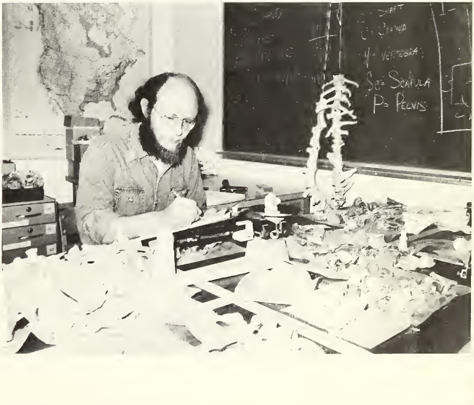


Figure 3.09: Analyzing Bone from N-2. . .Archaeologist Michael Sawyer recorded weights of bone fragments recovered from a test boring, an examination which showed a preponderance of beef bone in the deposit. (Jack Prichett)

TABLE 3.03
DISTRIBUTION OF ARTIFACT CLASSES
By Alignment and Boring

	Building Materials	Foodware	Bone	Clothing	Other	Total # of Artifacts/Boring
C-3 Boring No.						
#1	53 (85%)	7 (11%)	1 (2%)	0	1 (2%)	N = 62 (5%)
#2	33 (70%)	11 (23%)	0	0	3 (6%)	= 47 (4%)
#3	50 (88%)	5 (8%)	0	0	2 (4%)	= 57 (5%)
#4	37 (71%)	10 (19%)	0	1 (1%)	4 (8%)	= 52 (5%)
#5	33 (60%)	12 (22%)	0	0	10 (18%)	= 55 (5%)
#6	87 (36%)	105 (43%)	5 (2%)	0	46 (19%)	= 243 (22%)
#7	24 (61%)	9 (23%)	0	2 (5%)	4 (10%)	= 39 (3%)
#8	41 (34%)	64 (53%)	2 (2%)	1 (< 1%)	13 (11%)	= 121 (11%)
#9	13 (62%)	3 (14%)	0	0	5 (24%)	= 21 (2%)
#10	42 (10%)	160 (40%)	101 (25%)	13 (3%)	88 (21%)	= 404 (36%)
#11	20 (77%)	2 (8%)	2 (8%)	0	2 (8%)	= 26 (2%)
	433 (38%)	388 (34%)	111 (10%)	17 (2%)	178 (16%)	

Total number of Artifacts/Alignment C-3 = 1127 (100%)

N-2 Boring No.						
#1	10 (11%)	44 (59%)	9 (12%)	4 (5%)	8 (11%)	N = 75 (3%)
#2	6 (35%)	4 (24%)	2 (12%)	4 (24%)	1 (5%)	= 17 (1%)
#3	43 (9%)	413 (81%)	16 (3%)	5 (9%)	28 (6%)	= 505 (17%)
#4	41 (22%)	131 (56%)	16 (8%)	6 (3%)	20 (11%)	= 190 (6%)
#5	23 (29%)	40 (51%)	5 (6%)	- 0	10 (13%)	= 78 (2%)
#6	289 (29%)	449 (43%)	87 (9%)	6 (1%)	165 (17%)	= 996 (34%)
#7	160 (23%)	385 (55%)	92 (13%)	43 (6%)	43 (6%)	= 694 (24%)
#8	111 (29%)	173 (45%)	49 (13%)	25 (7%)	26 (7%)	= 384 (13%)
	681 (23%)	1588 (54%)	276 (9%)	93 (3%)	301 (10%)	

Total number of Artifacts/Alignment N-2 = 2939 (100%)

N-3 Boring No.						
#2	63 (91%)	0	0	0	6 (9%)	N = 69 (35%)
#4	13 (33%)	0	0	0	26 (67%)	= 39 (20%)
#6	8 (57%)	0	0	0	6 (43%)	= 14 (7%)
#7	12 (80%)	2 (13%)	0	0	1 (7%)	= 15 (8%)
#8	3 (21%)	10 (71%)	0	0	1 (7%)	= 14 (7%)
#9	14 (52%)	4 (15%)	0	0	9 (33%)	= 27 (14%)
#10	5 (25%)	2 (10%)	0	5 (25%)	8 (40%)	= 20 (10%)
	118 (60%)	18 (9%)	0	5 (3%)	57 (29%)	

Total number of Artifacts/Alignment N-3 = 198 (101)%

Table 3.03 compares the artifactual material obtained from borings on C-3, N-2, and N-3. From the numbers, it is apparent that in C-3, building materials predominated over food ware, although not by a great margin (38 percent of all artifacts to 34 percent). In comparison with N-2, however, the predominance takes on more meaning, since the N-2 borings produced more than twice as much food ware as building materials (54 percent to 23 percent). In addition, the relatively large number (16 percent) of C-3 artifacts labeled "miscellaneous" included 73 specimens of melted glass which could not be classed as either window or bottle fragments. The presence of such quantities of burned glass, however (more than 10 percent of the total sample), strongly suggests the deposition of 1906 fire debris, regardless of whether the glass was originally bottle or window material. In addition, the proportion of building materials along C-3 as a whole is severely skewed by the results from Boring #10, which accounted for 36 percent of all artifacts found on the alignment. In this boring, food ware items outnumbered building materials nearly four to one, while the miscellaneous category accounted for 21 percent of the artifact yield. Of the "miscellaneous" category for this boring, however, more than a third was burned glass, while nearly another third was coal, directly related no doubt to the coal and lumber docks which lined the Embarcadero for many years (**San Francisco Waterfront:** 319-322). Likewise a heavy concentration of bone, probably a refuse concentration from a restaurant on the piling-supported street, accounted for one-quarter of the artifact yield from the hole. Once the localized anomaly represented by Boring #10 is taken into account, the results from C-3 as a whole show a much more pronounced bias in favor of building materials over food ware, as expected.

N-3, on the other hand, shows a pronounced bias in favor of "building materials". In contrast to the earthquake and fire deposits of C-3, however, the absolute numbers are much smaller, totaling only about one-quarter of the average artifact yield per hole (28 artifacts per boring to C-3's average 112). Moreover, nearly a third of all these building materials artifacts came from Boring #2, where an analysis revealed that the majority of them were red brick chips. Of the seven N-3 holes used in the analysis for contrast, only Borings #2 and 4 produced an average of more than one artifact per foot of depth, again highlighting the relative sterility of the deposit. Similarly, in contrast to C-3, the "miscellaneous" category in N-3 is explained largely by the presence of shell deposits (84 percent of all "miscellaneous"). Thus, both qualitatively and quantitatively, important differences in the context of deposition arise between C-3 and N-3. The predominantly rock and sand fill of the latter contains far less artifactual material than the fill along C-3, although in both cases the bulk of the items may be classified as "building materials".

Both C-3 and N-3 contrast with N-2, which showed a preponderance of artifacts in the "food ware" class. N-2 had far more artifacts overall, as well, averaging 367 for each of the 8 borings considered in this analysis. Of the three alignments, N-3 lay most immediately behind the seawall, with all 7 of its borings located on the Embarcadero. It also showed the lowest artifact yield per boring. Of the 11 C-3 borings, 7 were on the Embarcadero immediately behind the seawall, while 4 were on Steuart Street about a block inland. Of the 3 alignments surveyed, C-3's artifact yield per hole was intermediate. Finally, N-2, where all the test bores were 1½ blocks or more inland, produced by far the highest artifact yield per hole. Thus, this analysis confirms what was suggested earlier: deposits further from the seawall showed a greater concentration of artifact materials than those closer to it.

Most of the artifacts retrieved from the test borings and logged in Table 3.03 above were fragmentary rather than whole. Few bore labels or manufacturers' marks, and other than observations on the soil type in which they were found, nothing can be said of the context of their deposition or of associations that might have been observable had they been excavated by hand. Accordingly, an examination of the distribution of artifacts in terms of provenience and concentrations is the most effective means of analysis because it provides a quantitative, if not a qualitative, clue to their meaning.

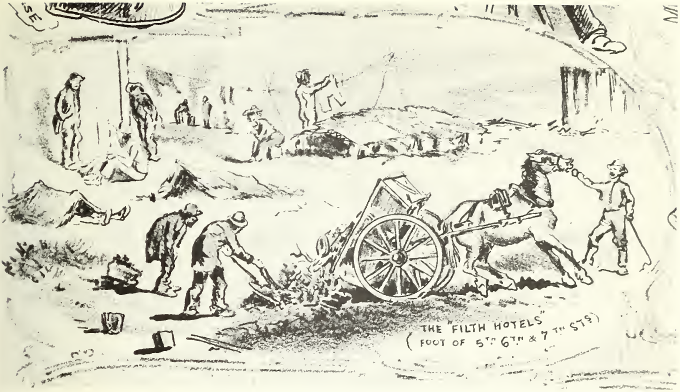
These observations conclude the analysis of the artifact content of the landfill soils behind the seawall. Next considered are the larger issues of dumping and waste disposal as general problems of urban life. Since archaeologists have traditionally dealt with waste materials, the subject is nothing novel. What is new is the historical urban context, which is the source of more--and more diverse--refuse than ever before discarded.

Creating refuse is a characteristic human activity, and the problems associated with waste disposal are faced by all cultures. The size, nature, and severity of this problem varies in accordance with a number of interdigitating factors. These include the size and mobility of a population as well as the kind and quantity of refuse it produces. In turn, these factors depend upon the types of raw materials used by the society and the level of technology available to it.

Solutions to the universal necessity to dispose of culture's clutter also vary. For example, the Indians who inhabited the San Francisco Bay Area for scores of centuries prior to the arrival of Europeans simply lived atop a constantly accumulating mountain of their own refuse. These "kitchen middens" were composed principally of mussel and oyster shells mixed with tons of campfire ash. Today's inhabitants of the same region, practicing a far more prolific form of the "throwaway culture", produce nearly a ton of solid waste per capita each year, including an entire range of materials inconceivable to their prehistoric and early historic-period predecessors. Today, fleets of trucks whisk away "no-return" glass bottles, styrofoam cups, Pampers, and chemical waste products in the increasingly sophisticated refuse treatment programs created by cities struggling to avoid being trapped in an avalanche of their own making.

These materials are put to a variety of uses in modern urban settings. Some of the landfill areas in the Bay region, for example, are like giant latter-day kitchen middens whose specific purpose is the creation of land for new building sites. Ironically, the residents of Emeryville's modern Watergate condominimum complex, living atop this kind of modern landfill, are within view of one of the region's most famous Native American middens, the Emeryville Shellmound (see Figure 3.12).

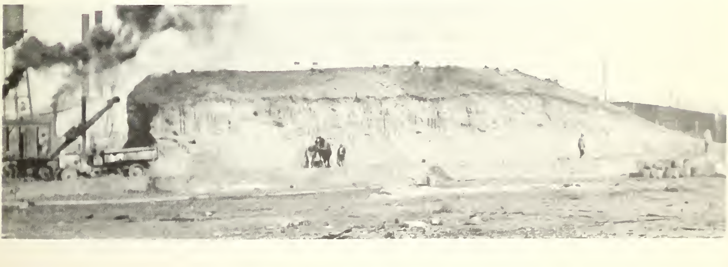
Long familiar with analyzing the waste disposal practices of past cultures, urban archaeologists have now started to look at those of their own (Rathje and McCarthy 1977). In doing so, they specifically look at the changing nature of the artifacts that are recovered, coupled with the patterns of waste disposal by which the objects came to rest where they were found. The chapters which follow examine the results of waste



THE "FILTH HOTELS"
(FOOT OF 5TH 6TH & 7TH STS)

Figure 3.13: The "Filth Hotels". . .In the 1870s the city's dumping grounds at the foot of Fifth, Sixth, and Seventh streets along the shrinking Mission Bay shoreline were home to hundreds of homeless vagrants. This portion of a cartoon from the **Wasp** of August 18, 1877, shows a cartman dumping refuse, scavengers picking through the debris for items of value, and dump dwellers going about their impoverished existence. (Bancroft Library)

Figure 3.12: Emeryville Shell Mound, 1924. . . San Francisco Bay's best known aboriginal site, the huge shellfish refuse dump was partially excavated by archaeologist Max Uhle in the early 1900s. By 1924, the 30-foot-high mound was being systematically demolished with the aid of a steam shovel. A few buried portions of some of the bay's 400-some mounds still exist. (Lowie Museum of Anthropology, University of California, Berkeley).



disposal practices in San Francisco a century ago and the stories of the artifacts themselves. However, because refuse disposal practices in San Francisco underwent a gradual but dramatic transformation in the last half of the nineteenth and first quarter of the twentieth centuries and because this transformation directly affected the time and nature of landfilling along the waterfront, the main outlines of the changes which have taken place will be sketched below. In this way, filling practices and archaeological findings take on a broader historical meaning and may be seen as part of larger trends in the evolution of life in the city.

The evolution of refuse dumping practices may be described as a series of overlapping phases. While written historical documentation concerning waste disposal practices becomes increasingly sketchy as one looks back in time, the sources suggest three main phases. In the beginning exists a pattern of non-centralized, largely unregulated refuse disposal, in which individuals make arrangements for themselves and their businesses. In a study of eighteenth-century Brunswick, North Carolina, Stanley South has described these patterns of individual refuse disposal at length (1977). As population grows, however, the amount of space available for refuse disposal decreases in inverse proportion to the growing amount of garbage and refuse produced. Accordingly, an increasing number of refuse-related problems, coupled with increased attention to health issues, results in concern among public officials and the establishment of regulations and ordinances. At this second stage, which developed in the late nineteenth century in San Francisco, municipal government takes its first halting steps toward full governmental involvement in the process today known as "solid waste management" by attempting to control, without actually administering, disposal practices. Finally, in the last phase, municipal and county governments become involved in creating, administering, and reacting to a network of health and environmental regulations within federal, state, and local jurisdictions. Individual latitude in refuse disposal practices is effectively reduced to little more than the choice of a garbage can. The links between this sequence of development, the filling of the waterfront, and the archaeological remains become more clear when the phases are examined in some detail.

In the "instant city" spawned by the Gold Rush, refuse disposal practices, like many other aspects of life, were rudimentarily carried out on an unorganized, individual basis. In a vivid commentary written in 1854, Soulé, in fact, suggests that refuse simply found its way out the nearest door. Describing San Francisco, he writes:

> There was no such thing as a home to be found. Scarcely even a proper house could be seen. Both dwellings and places of business were either common canvas tents, or small rough board shanties, or frame buildings of one story. Only the great gambling saloons, the hotels, restaurants, and a few public buildings and stores had any pretentions to size, comfort or elegance. . . . In those miserable apologies for houses, surrounded by **heaps and patches of filth, mud, and stagnant water**, the strange mixed population carried on business, after a fashion (emphasis added). . .(1855: 252).

By another account, the ambitious Forty-niner Samuel Upham noticed the litter of bottles which covered the ground in San Francisco and moved quickly to turn trash to profit:

> Pickles are scarce and sell at fabulous prices. **The beach of Happy Valley for miles is lined with discarded pickle-jars and bottles**, and I have conceived the happy idea of utilizing them. I have gathered up, cleansed and stored around my shebang, several hundred bottles ready for use. This afternoon, I boarded a vessel just arrived from Boston, and persuaded the captain to sell me a barrel of salted cucumbers and half a barrel of cider-vinegar, to be delivered to-morrow morning!
>
> After supper I wrapped myself in my blankets and laid down to pleasant dreams; but toward morning, I had a vision, and in that vision I saw--pickles. Captain Perkins delivered the cucumbers and vinegar, according to agreement, received his pay, and I immediately commenced bottling them. Before night, I had the largest stock of bottled pickles in San Francisco, and at the close of the week I struck a balance-sheet, and found that I had cleared $300 by speculation (emphasis added) (1878: 257-259).

In his survey of San Francisco's early years, historian Roger Lotchin discusses sanitation and street cleaning under the rubric of "urban problems", noting that

> the metropolis's record of keeping its avenues clean was not as impressive as its history of building them. Many mistook the thoroughfares for a dump and ornamented them with refuse and junk. Sometimes the street commissioner removed a part of the filth, and occasionally the city council took a hand. During the cholera epidemic of 1850-51, the council provided a garbage scow and fined people for discarding waste. Eventually, public scavengers were appointed; but by October, 1856, they had quit because of the government's inablity to

> pay them. Altogether, the scavengers, street commissioner, and people did only a mediocre job (1974:169).

Lotchin, who combed the city's newspapers for the Gold Rush period to compile his account, uses ample quotations to convey the impression that trash disposal was haphazard and unregulated. A drayman complained to the **Chronicle** that a primary nuisance to his trade was "the throwing of glass bottles, iron hoops, tin lard cans, tin cheese boxes, tin egg cans, wooden hoops with nails in them, besides any quantity of nails and all sorts of old rubbish, into the streets." Washington Square and the area of Market and First streets were "trash depots", and people dumped garbage into the bay at Jackson and Front, while "the night carts are fast filling up with an abominable compost the great holes in the street" (Lotchin 1974:170).

During the boom years of the Gold Rush and immediately thereafter, then, trash pits, privies, and casual discard were probably among the main, if not the single most important, means of rubbish disposal. Babits has demonstrated that trash pits are primarily an urban phenomenon first traceable to the mid-seventeenth century (1980), and in California, trash pits have been excavated at sites in Napa (Benté 1978:83-91), Ventura (Benté 1975), and elsewhere. While no archaeologically excavated trash pits have been identified in San Francisco, bottle collectors and curio seekers digging throughout the city have encountered a variety of features which suggest this function (Rush 1976). Outhouses, too, are well known as receptacles for household refuse (Benté 1978:83-91, 97-105; Benté 1975). In excavations conducted at the Moscone Convention Center block in San Francisco's South of Market district, the authors of this volume recovered large quantities of household refuse in six privy vaults, providing more evidence of the "dispose-all" function served by outhouses.

As San Francisco moved into the second phase of evolutionary development in dumping and refuse collection practices, steps were taken to centralize and regulate refuse disposal. Increasing concern developed over hazards and nuisances posed by unrestricted garbage dumping. Sharing in larger national and international efforts at reform and following the lead taken by Massachusetts, California had established by 1872 a state board of health, thereby becoming the third state to do so.

Problem areas such as slaughterhouses and tanneries soon resulted in ordinances which banned them to the outskirts of cities. Citing the minutes of the Sacramento Board of Health for 1876, Dr. Roy Jones noted that "animal refuse contributed its share to the city's stench. Slaughterhouses, banned from the city proper, dumped the unused remains of animals into Burns Slough and the Thirty-First Street canal on the eastern edge of the city. . ." (McGowan 1978:2). A parallel concern in San Francisco over the nuisance posed by the old Butchertown near Ninth and Bryant streets led to the "Butcher's Decree" ordinance, published in the Municipal Reports for 1870-71, which established a remote bayside section of the city's Islais Creek marsh for the site of all the city's slaughterhouses (Olmsted et al. In Press). The waters of San Francisco Bay, flushed twice daily by the tides, initially provided a disposal site for offal or the waste parts of butchered animals. Long after most direct dumping into the bay was halted, however, Butchertown remained on the south shore of Islais Creek, eventually succumbing to economic pressures rather than health and environmental concerns (Ibid).

Dealing decisively with another regular waste disposal problem as early as 1866, the city and county of San Francisco entered into a contract with one Gustavus Wetzlar to "remove from the streets for a period of 20 years. . .the carcasses of all dead animals." This may have been the first contract made by the city for this purpose, and the length of the agreement reached with Wetzlar suggested an albeit optimistic attempt to establish a regular, long-term solution to a nuisance and health hazard in nineteenth-century urban life (**San Francisco Municipal Reports** 1889-1890: 213ff).

San Francisco's solution to the problem of what to do with the growing amount of refuse produced by its citizens and industries was "Dumpville", the name loosely applied to the conveniently located, officially designated waste disposal area lying along Berry Street. Bordering the rapidly shrinking Mission Bay between Sixth and Seventh streets, this spot began to receive the garbage generated along Market Street and in the South of Market district, if not that of the outlying neighborhoods. At the dump, "sanitary landfilling" (or the process of covering refuse with soil and sand to prevent the dissemination of odors and attraction of rats) accelerated the creation of "made land", and Berry Street, site of the C-1 sewer segment, came into being. While documentary evidence concerning the early development of the dump site is incomplete, the Sanborn Map for 1877 shows Berry Street partially filled between Fifth and Seventh streets, whereas the 1869 Coast Survey Map clearly shows this area under water. Therefore, the dump at Sixth and Berry got its start sometime between these two dates (**San Francisco Waterfront:** 41-51).

Certainly by 1877, at least, the dump had become a recognized part of life in the city's South of Market district. A "Local Chips" cartoon published in the August 18, 1877, **San Francisco Illustrated Wasp** depicts the "filth hotels", or shanty towns, existing on the dumps at the foot of Fifth, Sixth, and Seventh streets (see Figure 3.13). A year later in 1878, the **San Francisco Daily Evening Post** ran a series of articles spotlighting the plight of the city's "bummers" or hobos, written by a **Post** reporter who disguised himself as a tramp and lived among the dwellers of Tar Flats to chronicle their lives. In the fourth of the ten-part serial titled, "Trying Tramping", the author mentions the scavengers and vagrant squatters at the Channel Street dump, thereby documenting its existence at that time. Wondering where next to proceed in his odyssey among the poor, he rhetorically asked:

> Where else but to the dumps? There could be found penniless humanity engaged in its Daily Struggle With Want and Privation. There could be seen the tramps, seeking to wrest from the loads of garbage continually arriving that sustenance which other and more agreeable means failed to provide. In the southern part of the city, on Berry Street, between Sixth

> and Seventh, I came to where is daily deposited the refuse of the city (**San Francisco Evening Post**, August 10, 1878).

Both the **Illustrated Wasp** cartoon and this passage clearly imply that the Sixth Street dump was certainly the main, if not the only, dumping area designated for refuse disposal. This impression is strengthened by an article appearing 11 years later in the **San Francisco Chronicle**, which refers to the site as "the public dumping ground of the city" (**San Francisco Chronicle**, September 22, 1889). It was estimated that at least 300 teams of horses a day carried refuse to the site, including teams contracted by the city's street cleaning department. The dump apparently persisted in use well into the 1890s (**San Francisco Call**, November 1, 1895).

This evolution of refuse disposal in San Francisco must be viewed against the background of the socio-economic organization of dumping activity in the city at the time. Developmental changes in urban waste disposal practices are related to the growth in San Francisco's population, and the rapid influx of people, conjoined with the widespread economic depression during the decade 1870-1880, not only prompted greater centralization of waste material dumping but also forced many citizens to live in abject poverty on the dumps themselves. The history of these denizens of this "south of the South of Market District", however, has barely been recorded.

Between 1870 and 1880, San Francisco's population increased dramatically from 150,000 to 235,000. Many of these new arrivals crowded into already congested areas south of Market Street. According to Averbach, Germans, Irish, and English immigrants were absorbed into this workingclass section of the city, with many spilling over into less densely populated areas beyond Tenth Street (1973: 200). The exhaustive archival study on the South of Market Street blocks by Olmsted, Olmsted, Pastron and Prichett (1979) on the Yerba Buena Center fully documents development in this vital and oftentimes volatile area of the city, and the reader is referred to this volume for further details. Here we wish to elaborate only a few salient issues.

Rapid demographic growth had far reaching implications for the social and economic character of the South of Market Street district. Immigrants from Europe and the East Coast pouring into the South of Market area made it the most densely populated portion of the city by

1880 (Ibid:34). The vast majority of the newcomers were single men who jammed themselves into any available room they could find. Within a few years, numerous hotels and boarding houses had sprung up along the streets and alleys south of Market Street in order to accommodate all those looking for a bed. Soon, half of San Francisco's boardinghouses, one-quarter of its hotels, half of its lodging houses, and one-third of all the city's 250 listed restaurants were packed into the area (Averbach 1973: 201). These establishments became home to the mass of new residents who gravitated to the Golden City in quest of work and wealth or who waited out the winter months or cyclical economic crises for more favorable fluctuations in agriculture, mining, railroad building, construction trades, and other areas of the labor market.

In 1871, Henry George observed impoverished migrant workers "disappearing after the wheat harvest into the flophouses of San Francisco only to come back the next season like so many ragged crows" (see Averbach 1973:201). Not long after, another contemporary observer described the multitude of transients he met on the road as "blanket men," "runaway sailors," "reformed street thieves", "old soldiers", and "bankrupt German scene painters" (see McWilliams 1939).

Throughout the economic depression of the 1870s, some of these men became squatters on the expanding malodorous urban rubble heap rimming Mission Bay, and newspaper accounts attest to the presence of a community of vagrants who lived amidst the debris. In the **Daily Evening Post** serial, "Trying Tramping", the author describes them:

> Here were congregated many people of all nationalities, their wan and pinched countenances plainly showing the inroads that want had made there. Their clothes, ragged and soiled, and their faces and hair, unwashed and unkempt, were in keeping with their general air of dejected doggedness.

The dwellings they quickly fabricated on the dump reflect the squalor of their life there. According to the anonymous **Post** reporter who was disguised as a wayward tramp, the scavengers' quarters evinced some degree of homogeneity, if not a code standard. The "houses"

> were uniform in their squatter style of architecture, in size about ten feet square and six in height, and the material used in their construction was of every variety and substance known to the building world. The frames had been constructed out of fence posts, pieces of scantling, old gas pipes, etc., foraged

> from some neighboring lumber yard, the whole covered with old matting, pieces of carpet, blankets, tin-roofing, etc. (**Daily** Evening Post, August 10, 1878).

Some of the more "artistocratic" shacks boasted old iron stoves with careening, rusted stove pipes. Inside were broken cooking pots, handleless frying pans, and assorted tin cans. Invariably, in one corner of each shack was an old mattress made of sacks and straw covered with old coats and torn blankets; wooden boxes and crates often served as chairs and tables (Ibid.).

While life on the dumps may not have been joyous, healthy, or easy, it had certain adaptive economic advantages. Far from being idle, people living in Dumpville were constantly scavenging for articles of use or value. The **Post** reporter/tramp describes the scene in the following manner:

> Many were busily engaged with pitchfork, shovel or stick, poling, sifting each load as it was dumped from the reeking, overflowing carts. Nothing was too small for their quick, sharp eyes to discover, or too little valuable for their wits to utilize. Rags of any and every description, old bottles, cans, scraps of iron, glass, old sacks, corks, pieces of wood, brick, oystershells--all was preserved with an eye single to the future dimes their accumulated store would yield (Ibid.).

Despite the earlier reference to Samuel Upham's profitable reuse of discarded pickle jars, this 1878 **Post** story is perhaps the earliest published account of the first recycling center on the West Coast. Fossicking and scavenging are traditional ways to recycle scarce or potentially useful material goods that others in a culture have for one reason or another discarded. Waste materials have had many practical uses besides landfill, and in San Francisco of the 1870s and '80s, when many goods were in short supply, old bottles, rags, wood, tin cans, and other items found in the dump commanded resale value. Apparently, even "half-decayed fruit or vegetables, old bones that had passed through all the stages of usefulness from royal roast to humble soup, were prizes not to be overlooked" by those picking through the heaps of garbage (Ibid.).

Although the organization of the dump is sketchy at best, it appears that from the beginning there were several self-made political bosses or "commanders-in-chief" of the South of Market dump, and control over the dump and its profits grew progressively tighter with passing years. According to the 1878 Post serial, an "Old Italian" commanded a degree of power and respect, acting as the leader of his squalid surroundings. As head of the dump, he apparently controlled scavenger access to the reusable goods found in the debris. For instance, he allowed the "heathen" Chinese scavengers who squatted at the corner of Sixth and Berry streets access to whatever they could carry off only after four o'clock in the afternoon when everyone else had picked through the rubbish deposited that day. In addition, he charged the Chinese "two bits a head" for the privilege. This self-proclaimed scavenger boss commandeered a gang of several others, and he estimated they would usually "clean up from $2 to $3 at the end of the week."

The market value of scavenged articles and old junk was approximately as follows:

> Rags brought from 1 to 3 cents per pound, according to quality; sacks from 3 to 8 cents each; bottles from 5 to 15 cents per dozen; small medicine vials, wine and beer bottles and the large, long-necked champagne bottles rank in value in the order named, the first mentioned being the least valuable. Scraps of iron brought a cent a pound, and cans of all descriptions were marketable, oil cans being a prize worth fully 10 cents each (Ibid.).

Based on these prices for recycled goods, it is conceivable that the "Old Italian" and his cohorts divided a significantly greater amount of money than he cautiously divulged to the **Post** tramp/reporter. In any case, as dismal as life on the dumps may have been, a livelihood was still possible for those who were vigilant and frugal.

A decade later, the dump still persisted; however, it had grown astonomically to cover more than twenty acres. By the late 1880s, it included the entire south side of the newly reclaimed Channel Street. Large sketches of that portion of Mission Bay had been filled and made into "new" land, chiefly from deposits of the city's refuse. According to a **San Francisco Chronicle** article on September 22, 1889, in less than a year the entire block between Hooper and Irwin streets had been filled and reclaimed. More important, however, is the fact that not only was more garbage being dumped daily into the area but that the entire dump by 1889 was under the strict control of a six-person "company" of dump inhibitants, under contract to the city. The nature of the contract is not clear from the **Chronicle** article, but the rights granted the "company" were managerial, designed to "obviate abuses and insure reliable handling of the refuse problem." The **Chronicle** reporter refers to this unusual consortium as the "Dump Trust", a grandiloquent title satirically bestowed. His account goes on to reveal that:

> These six persons not only labor themselves from 'morn till dewy eve' at the happy dumping grounds, but they employ eight men at an average wage of $9 a week. No other persons are allowed to handle or remove any of the refuse, except by permission of the trust, and this permission is only granted to children seeking firewood or food for chickens. There are generally from 50 to 100 children, boys and girls, so engaged, and by the time they have gone over the heaps already sifted by the dumpster's pitchfork there is very little of value in the residue (**San Francisco Chronicle**, September 22, 1889).

The dump trust exercised a virtual monopoly over the trade in discarded glass, scrap iron, and tin cans coming into the South of Market Street refuse disposal area. According to the **Chronicle** story, "The unbroken bottles are bought up by a wholesale dealer; the broken ones go with the rest of the broken glass." Since we learn that "the glass is sold in Chinatown, whence it is shipped to China," presumably much of the nineteenth-century glass refuse from the city ended up in the Orient. The shipments of broken glass included:

> thousands of photographic dry plates, used and unused. Occasionally whole boxes of dry plates are thrown out in this manner by some intelligent amateur who has taken off the lid of the box or otherwise exposed the plates to white light and of course spoiled them all.

All the bones entering the dump were sorted out, sold, and delivered to the sugar refineries every evening. Copper, brass, and zinc items culled from the refuse were lumped together and sold to wholesale dealers by the pound, while the scrap iron was sold separately to other buyers. Any unbroken coal-oil cans were prized because they could be sold for 2-1/2 cents each. However, the elaborate process developed at the dump to refurbish tinware is of particular interest:

> The tinware receives special attention. The tomato, oyster and vegetable cans of all shapes and sizes are carefully collected and passed through a furnace at a low heat for the sake of the solder, which collects in large blocks in the hearth below the furnace. The quaint old shanty used for the smelting process stands on the corner of the dumping ground at the Sixth Street end, and is surrounded by a mountain of tin cans twenty or thirty feet high. An immense percentage of these cans contain spoiled produce, peas, peaches, tomatoes and oysters. Such is the number of these filled cans that the

> trust finds it necessary to employ an old man to open and empty them. The veteran sits in front of a trough sloping down to the creek, and just as fast as he opens each can with a few blows. . .a fresh stream is added to the thick, slimy mass moving lava-like down the trough. After the cans have been moved through the furnace, they are shipped to the various iron foundaries, to be used in working refractory ores.

Given this zealous scavenging of recyclable articles and usable scrap materials, it is a wonder that there was any rubble left to be used as landfill! In light of all this activity, the city dump during the last century constituted a little known but important urban industry, as well as one which had an impact on the nature of the artifacts found one hundred years later.

Throughout the city, scavenging was by no means a casual affair. As those who controlled the dumps profited from their resourcefulness, so garbagemen with teams of horses and carts who vied against each other for contracts to collect garbage from homes and businesses on virtually every city block made a living for themselves. In his history of the city's scavengers, Stewart Perry highlights their fierce competitiveness when he observes that "a horse, a wagon, and a gun were standard equipment" and that men banded together with their sons, brothers-in-law, and other relatives to protect themselves from the aggressive business practices of the other independent refuse collectors (Perry 1978:15).

Naturally, conflicts occasionally erupted between the unorganized, independent scavengers. Perry summarizes some of the issues as follows:

> In a city with no municipal sanitation services, scavenging became a way to make a living, particularly if one carefully sorted out the refuse to save everything that might be saleable--rags, bottles, seemingly irreparable furniture, whatever. And of course, true garbage or swill was especially valuable; it could be sold to the pig farmers on the outskirts of the city. While a householder would pay a scavenger to take away the garbage, the scavenger probably would have to pay for the privilege of carting away the garbage of a hotel or boarding house, because that would be an immediately resaleable quantity (Perry 1978:16).

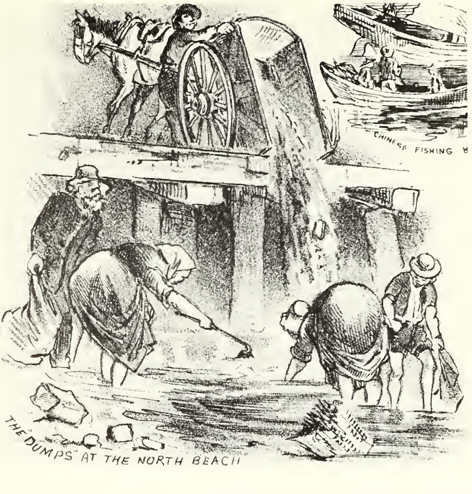
Nineteenth-century urban waste took on the characteristics of a "limited good", and many men struggled to corner the market on it. The independent scavengers working the city blocks and the men more closely affiliated with the dump all carefully picked over the city's refuse, searching for anything of value. Many of these men also maintained repair shops for fixing and selling broken household utensils or furniture which people had abandoned. Some scavengers sold directly to junk dealers, also numerous in the late 1800s, who added to the complex economic web centering on recyclable waste materials.

While the "Dump Trust" may have gained a measure of economic security in the waste trade, and while others made a minimal livelihood as scavengers, many merely continued to co-exist in poverty on the city's refuse heap. But due to mounting pressure for usable land exerted by the growing city, increasing concern over sanitation, and a desire to remove unsightly problems from view, the Sixth Street dump was nearing the end of its usefulness.

On Saturday evening, November 9, 1895, Dumpville was burned down by a police task force (**San Francisco Call**, 1895 and see Figure 3.14). According to the **Call** article, "Dumpville Is No More", which reported the incident:

> Its shanties. . .have vanished and the inhabitants thereof are gone. The bacillus of the Mission Creek swamp must look elsewhere for its prey, and the bacteria of the canal which is misnamed Channel Street will now have to feast upon the occasional visitor to the dumps, for the town of Dumpville, its mayor and council, its bosses and its juntas, it sociological free lyceums and its midnight 'growler' soirees, are henceforth to be reckoned only among the dim and dusty memories of the things that have been. Dumpville has been effaced.

The factors leading to the forced destruction of Dumpville reflect certain Victorian middleclass values, as well as the changing socio-economic conditions in the city during the 1890s. During the intervening six years from 1889 to 1895, the dump south of the city had continued to expand, eventually forming and encompassing much of Channel Street located across from Berry Street on the other side of the polluted Mission Creek canal (see Map 1.02). Most of the reclaimed land in that vicinity had been profitably sold or leased, and the "Dump Trust" of the late 1880s appears to have disbanded. Nevertheless, the city continued to retain "a keeper of the dumps, to whom was delegated the duty of having the offensive matter covered with sand and the deposits so regulated as to abate the nuisance so far as that was practicable" (**San Francisco Municipal Reports** 1895-96, p. 175). Throughout the early 1890s Dumpville continued to serve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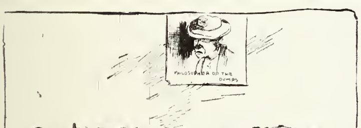
THE "DUMPS" AT THE NORTH BEACH



DUMPVILLE—A SCENE OF DESOLATION.

Figure 3.15: "The Dumps at North Beach". . .Throughout the nineteenth century, household and commercial garbage was dumped along the San Francisco waterfront. While much of the refuse went to Mission Bay, trash from people living in the northern part of the city "flowed" into the North Beach "catchment" area. This **Wasp** cartoon from 1877 depicts dumping along North Beach, while busy "fossickers" search the debris for items of value. (Bancroft Library)

Figure 3.14: "Dumpville--A Scene of Desolation". . .For over twenty years, Dumpville served as San Francisco's main refuse disposal area. Garbage dumped there became landfill, after being scavenged for reusable glass, scrap iron, and tinware, as this **Wasp** cartoon of 1877 suggests. Notorious for its collection of disreputable residents, Dumpville was ostensibly the scene of fighting and drunken brawling that led to the torching of the area in 1895. This ended a source of lingering irritation to middleclass Victorian sensibilities. (Bancroft Library)

as a notorious refuge for downtrodden derelicts, hobos, and an increasing number of unsavory criminals, and in fact, it was the presence of over 150 feuding vagrant squatters suspected of a range of petty crimes that prompted the police crack-down and clean-up of the area--and the complete demolition of Dumpville.

According to the 1895 **Call** article the presence of one Stephen Maybell and his "Heaven-at-Hand" Army camped at Channel Street near the Sixth Street bridge riveted attention on the dumps as an illegally inhabited ward of the city. Following a major drunken brawl one evening, in which all were carted off to the Folsom Street police station, they were replaced by other vagrants moving in from former haunts at the post office on Seventh and Mission streets. For a time, the old soldier Jack Ryan consensually ruled as mayor of Dumpville presiding over a mock city council of vagrant citizens, until brawling and disorderly conduct gave the police its excuse to move in and evict all the inhabitants.

According to this newspaper account:

> The great trouble with Dumpville was that it happened to have been located upon land belonging to the Southern Pacific, and its citizens had no real resources of their own. Now and then something would be missed from a freightcar of the railroad company, and once in a while some lumber would disappear from the lumber yard of lessees of the company's property along Channel Street. Complaint was made to the police; hence the march of the twenty stalwarts out Sixth Street and the destruction of Dumpville (**San Francisco Call**, Ibid.).

It is unclear where these south of South of Market residents moved next. Presumably, they drifted even further south of the city along what was left of the shrinking Mission Bay shoreline. While the police were determined to keep the dump clear and eliminate the area as a rendezvous for "undesired outcasts," the dump itself continued to receive urban refuse throughout the 1890s, regardless of city ordinances to the contrary.

DUMPING ON THE NORTH WATERFRONT AND A THEORY

Historical accounts concerning the organization of refuse collection and details of dumping practices in the 1860s, '70s, and '80s are scarce (see, for example, the sketchy treatment in Perry 1978). While a full-scale research effort might yield additional information on the topics, such an exercise is outside the scope of this report. Nonetheless, the archaeological data recovered from C-1, N-2, and N-5, combined with the historical data at hand, suggest a rudimentary geographical model to explain patterns of landfill refuse dumping in San Francisco.

Seemingly, at least two major refuse catchment areas existed in the city. The crests of Russian, Nob and Telegraph hills, separating Market Street and the downtown area from North Beach, formed, so far as may be determined, a sort of "garbage divide". Refuse, like rain water, flowed north to the Bay from Chinatown and the north slope of the hills, while refuse from Market Street, the South of Market district, and the south slope of Nob Hill ultimately ended up at Dumpville.

While Dumpville was referred to in the 1889 **Chronicle** article as the city's "only authorized dumping ground," archaeological evidence from N-2 and N-5 makes it abundantly clear that much refuse was being dumped in "unauthorized" fashion along the north waterfront (**San Francisco Waterfront**: 617-658; Pastron 1977b, 1979b). Considering the extra effort and time required to drive a horse and wagon over Russian and Nob hills from Chinatown in order to reach Dumpville, the inviting expanses of tidal flat along the city's north front must have appeared as the simplest dumping spot (see Figure 3.15). In the 1880s, such dumping became part of the behind-the-seawall filling process.

Obviously, dumping occurred all along the waterfront, and the simple model proposed here is hardly a finely focused analytical tool. Nevertheless, this hypothesis of regional refuse deposition points to certain significant historical patterns in urban solid waste disposal practices. Furthermore, the patterns that have emerged suggest not only the specific regions of the city originally responsible for the garbage but also point to the particular ethnic neighborhoods that may have contributed to the depositied debris.

The End of Free Style Dumping

By the late City Building period, the use of garbage for fill was widely critized and open dumping attacked for its social as well as its health and aesthetic effects. This caused the city's supervisors numerous problems and prompted them to search for new solutions to the problem of refuse disposal. A section of the **Municipal Reports** for 1895-1896, entitled "Franchise for Disposal of Garbage," begins with the following observation:

> The deposit of garbage, etc., which had been pursued for years in filling up water lots in the northern and southern portions of the city, became such a nuisance that efforts were made from time to time to alleviate the same by changing the location of the dumps, but as the offensive odors and the danger to health were as apparent in one locality as in another, it became a serious question as to what disposition should be made of this material.
>
> In 1890, the board of supervisors had passed Order No. 2,300 to deal with the problem. The new order "prohibited the dumping or depositing of butchers' offal or garbage, or any putrid or stinking animal or vegetable matter, or any refuse, dirt, or ashes, cinders, sludge, acids or other like matter, except the same be dumped or deposited into (proper) receptacles" (p. 174).

Passing an order was easier than enforcing it, however, as evidence from the archaeological test borings along N-2 confirms. Boring #6 produced nearly 850 artifacts from rubbish-laden fill at the northwest corner of Taylor and North Point streets, an area which was still under water as late as 1905 (**San Francisco Waterfront:** 643). The municipal report continued by citing a report from a sub-committee to the board, which had stated that:

> the order as to its disposition is a dead-letter, owing principally to no facilities being extended by the municipality to aid in carrying out the conditions imposed. While at times various persons have applied for franchise to take and dispose of the garbage and refuse, none of the propositions met with favor, the conditions and emoluments to be derived being considered all to be in the interest of, and for the benefit of the applicants.
>
> The disposition of this decaying matter, other than by filling in lots, where it festers and throws off noxious gases deleterious to health, and in case of the prevalence of any epidemic disease, a fruitful source of danger to the lives of our citizens, calls for the inauguration of some proceedings whereby garbage and rubbish may be cremated, and unless the municipal authorities take charge of and provide those means, this practice will continue until some disastrous result

> awakens our people to a sad realization of the criminal neglect which has permitted this nuisance to exist (Ibid.).

In April 1894, in an order more specific than the previous Order 2,300, the board had declared that dumping at the foot of Seventh and Channel streets constituted a public nuisance and should be ceased (p. 176).

These passages illustrate the growing public annoyance at uncontrolled dumping practices and increasing pressure for governmental action to regulate, if not take over completely, the function of refuse disposal in the city. In responding to this pressure, the board considered a number of alternatives at the turn of the century. Accordingly, proposals both for disposal at sea and for incineration were aired and contracts let. By the 1890s, then, the need to bring refuse disposal under municipal control was clearly articulated and increasingly being acted upon.

Free-style refuse dumping in San Francisco north of Mission Creek (today's Channel Street) effectively came to a close around World War I, a period that coincided with the completion of filling behind the final segments of the seawall along the south waterfront. The southern part of the city (for example, the Islais Creek and India Basin areas) continued to receive rubbish-laden fill for many years (Dow 1973: 152-86), but in the center of the city, the area considered in this report, the third stage of city-regulated and administered refuse disposal practices began in the second decade of this century.

By 1921, the city government announced its intention to receive bids from competent private companies for contracts to pick up refuse in city-outlined collection districts. Strangely, this attempt to operate a municipally contracted system failed because no companies bid for the contracts (Perry 1978: 18). As a result, private companies continued to handle the work. The steadily shrinking number of scavenger businesses finally left only two companies to carry all of San Francisco's refuse. To sum up the ensuing years' story, the Sunset Scavenger Company and the Golden Gate Disposal Company have collected all the city's refuse from two municipally established collection districts since 1939 (Perry 1978: 20). This resolution culminated a long period of city experimentation with different disposal approaches, including unpopular attempts at municipally operated incineration facilities (**San Francisco Municipal Reports** 1895-1896: 176; Perry 1978: 18).

Today, landfilling has continued as a major means of refuse disposal, but it takes place at increasing distances from San Francisco itself. In the 1950s and 1960s, most of the city's garbage was dumped as fill at a tidelands site in nearby Brisbane and more recently a place further south in Mountain View (Perry 1978: 130-131). The Mountain View site is limited in capacity, however, and prospects for future landfill in the immediate San Francisco area appear very bleak.

The shift to disposal in 25-mile distant Mountain View required a large investment in new technology to develop a Solid Waste Engineering and Transfer System (SWETS) (Perry 1978: 132). The plant symbolizes the fact that San Francisco, like other cities, will be forced to turn directly or indirectly to alternative methods of rubbish disposal. New state and federal environmental requirements, coupled with a virtual halt on bay filling and the resistance of smaller communities to being dumping grounds for the city's garbage, will mean that San Francisco will be pressured to find new technological solutions for its problems. In the future, refuse may be deposited as far away as Stockton some 60 miles to the east. Approaches likely to be more widely employed include intensive recycling of glass, metals, and cardboard, high efficiency incineration, and composting.

Today's refuse disposal problems, although far greater in magnitude and regional rather than municipal in their implications, reflect a continuation of the concerns and practices which engaged San Franciscans in the late nineteenth century. Garbage disposal through landfilling was accepted, albeit amidst rising complaints, and the deposits encountered during the Wastewater Management's archaeological program date mainly from the heyday of filling and uncontrolled refuse dumping. The largest single refuse concentration was garnered at the N-5 alignment, and that collection, discussed at length in Chapters 5-11, therefore represents a stage in the urban evolution of San Francisco as well as a collection of artifacts from a particular historical period.

THE KING STREET SHIP

> The odor of whale oil that pervades the neighborhood of the Howard Street wharves, where the old **Charles W. Morgan** lies at the bulkhead, was sniffed with evident pleasure yesterday afternoon by scores of people who were seemingly glad to feast their eyes and olfactories on a genuine whaler of the old time.
>
> Note by a waterfront news reporter, 1903

On Tuesday, June 13, 1978, Archaeologist Allen Pastron phoned Historians Roger and Nancy Olmsted with the news that the contractor laying the C-2 section of the waterfront sewer system had literally run into what appeared to be the remains of a large ship. The discovery site was near the foot of King Street, at its juncture with the Embarcadero opposite Pier 42.

Approaching the site for a first-hand view, the two historians puzzled about how anything as large as a "ship" could possibly be uncovered in what had been the basin of the Pacific Mail Steamship Dock. Having thoroughly investigated the history of the waterfront prior to the beginning of the wastewater construction project, they knew that the Pacific Mail Dock had been San Francisco's busiest wharf serving trans-Pacific steamships from the time it was erected in 1867 until the city built a seawall across the foot of King Street. The seawall, begun in 1903 and finished in 1908, blocked off the basin from San Francisco Bay, and over the following decade the basin was filled and developed. The historians' 1977 archival study of the development of King Street had specifically speculated about the types of cultural remains that might be encountered in this particular spot during excavation for the new sewer (a trench about 20 feet wide and up to 30 feet deep). "What type of cultural debris might there be" in the Pacific Mail Basin, they had asked.

> Obviously, it would include such items as bottles and other personal consumables of the same type that we would expect to encounter on the C-1 alignment (Channel Street) in the way of Long Bridge. The other end of the range of materials might include such items as Chinese ceramic wares cast or dropped off the incoming vessels from the Orient. There will almost certainly be no coherent deposits of cultural materials, but the range of individual items might be very large. The pilings of the original ferry slip built by the Oakland Railroad and Ferry Company in 1868, as well as those of the initial Second Street Wharf will probably be encountered (**San Francisco Waterfront:** 220).

Perhaps , ventured the historians, the "ship," as seen by the archaeological team, was in reality the remains of some small craft, possibly in association with a pier structure. As the 1977 archival report on the adjoining C-3 section of the sewer noted, the Mail Dock Basin had witnessed a great deal of waterfront activity, as well as the comings and goings of the great Pacific steamers. South of Market historian Roxburgh recalled:

> There was a small beach with a small dock between First and Second Street. Here the steam schooners would coal or lay up. The Nautilus Boathouse was close by. The boys who were members of the club would go rowing from there. The first whale ever caught in the bay was hauled up on this beach (1869) and an admission charge of fifty cents was charged to see the whale. Business was fine until the whale got over ripe (Roxburgh 1933: 17).

As State Senator Thomas A. Maloney recounted:

> The old Shrimp Schooners, the **Jack** and the **Jim** used to dock just across from the old Pacific Mail Steamship Company. How happy were the boys those days when they worked in the shrimp boats and at nine o'clock in the morning brought the milk cans into the Cuckoo's Nest to be filled with old Hibernia brew, and how they used to put it over on us, during the noon hour, by placing some butter at the bottom of the can and during the rush have the cans filled with beer with no foam on it, getting about $2.50 worth of beer for twenty cents (Maloney 1932: 10).

The archival report summarized this activity:

> Sculls from the rowing club, shrimp schooners that brought in the tiny bay shrimp preferred by gourmets, the big railroad car ferry **Thoroughfare** that transported freight cars from Oakland, the tug **Mission Rock** that took the longshoremen back and forth to Mission Rock to work the grain ships from Europe--these are the remembered craft of the '80's that criss-crossed the basin of the Pacific Mail Dock with a wide variety of maritime activities. All of these were in addition to the well-documented comings and goings of the Trans-Pacific steamers of the Pacific Mail Dock itself--the **Coptic, Doric, Hong Kong Maru, Nippon Maru, City of Sydney, City of Para, Rio de Janiero, Peking, China, Korea, Siberia, Mongolia** and **Manchuria** (**San Francisco Waterfront:** 73).

While it seemed possible that the hull of some large launch or small tow boat, or a craft the size of one of the ubiquitous San Francisco Bay scow schooners (30-60 tons), might have been left to lie in the backwater near the railroad ferry slips that bounded the south side of the basin, the very quantity of maritime activity militated against the likelihood of a vessel that might be described as a "ship"--200 or 300 tons or more--being sunk in such a spot. A sunken hulk would constitute an obstuction requiring removal.

In the 1977 report, three test borings had been recommended for the area: "Two test borings should be placed in the area 100-300 feet northeast of the intersection of King and Second Streets, as this is the location where vessels were once ready to be taken up on Tichenor's Way . . . ," and "one test boring should be placed at the end of the C-2 alignment . . . as this location is almost exactly in the center of the Pacific Mail Steamship Company Basin" (**San Francisco Waterfront:** 232). However, three borings in a space of about 450 feet might easily have missed any hulk because the borings are valuable primarily in testing for the nature and type of rather widely distributed cultural materials. A spacing of about 20 or 25 feet between auger borings would be necessary to locate a ship with any certainty, and they would have to be even closer for a small craft.

A FIRST LOOK AT THE SUSPECTED SHIP

After the archaeological investigator had halted construction excavation and when the historical investigator arrived at the site, portions of what appeared clearly to be the sides of some kind of vessel were immediately apparent. What could be seen were two rows of cut-off or chewed-off frames, with portions of planking and ceiling attached, extending diagonally across the muddy bottom of the 20-foot-wide sewer trench. It was by no means apparent what type of wooden hull this was, and it was not even clear how large it was, except that the size of the timbers indicated that the vessel was either moderately large (150 tons or more) or if smaller, extraordinarily heavily built. The frames were seen to be single, like pickets in a fence, rather than doubled, with a space between each pair. This kind of construction, relative to West Coast-built vessels of the late nineteenth century, suggested a straight-sided hull section, as in a scow or barge. Typical round-bottomed vessels, such as the coastal lumber schooners, were built with the futtocks that make up the frames doubled, with overlapping joints, thus giving an entirely different appearance when viewed in plan or profile (see Figure 4.14 below for illustration of nautical construction terms).

Orientation of the Section

Figure 4.01, taken Friday, June 16, after the muck surrounding the hull had been cleared away, shows most of the immediately visible parts of the ship as she lay, their relationship in the structure, and the lie of the vessel in the sewer excavation. In describing this and other pictures, however, the poblem of compass orientation must be discussed. The San Francisco streets south of Market Street do not match the cardinal points of the compass, and by convention, streets parallel to First Street are described as running north and south, while those parallel to Market are said to run east and west. Thus, King Street directions are east and west, and we accordingly refer to the north and south side walls of the sewer. The center line of the ship, running diagonally across the sewer, in fact, runs approximately east and west. Thus, in a figure such as Figure 4.01 or 4.11 below, we find ourselves looking diagonally "east" down the sewer

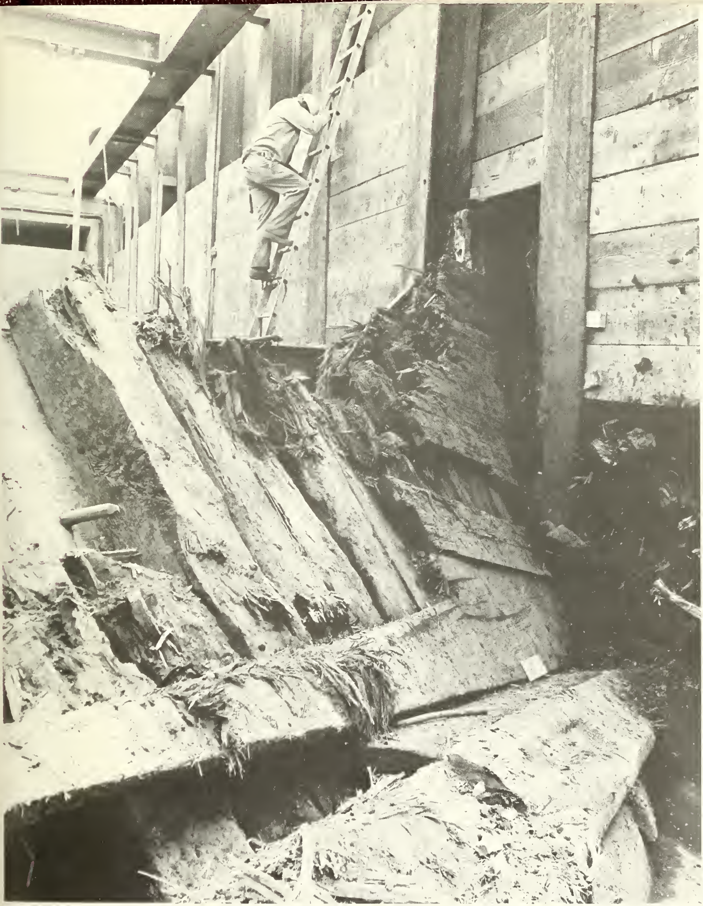


Figure 4.01: The Remains in King Street. . .The huge size of the King Street sewer--over 20 feet wide and 30 feet deep--is suggested by this photograph. Taken after trenching with heavy equipment had been halted and the earth around the hull removed under archaeological supervision, the view shows why some observers did not find the vessel very prepossessing. (John Kortum)

trench at the protruding north side of the ship! To avoid such anomalies for a brief space, we will lever the vessel into the conventional orientation of the sewer and streets, and the ship will be said to lie north-south across the east-west 1978 sewer cut. So, in Figure 4.01 we will say that the far side of the hull is the east side, and that at the right the vessel angles south into the south wall of the sewer.

The Ship Revealed

Excavation under the direction of the Principal Archaeological Investigator and the Principal Historical Investigator, who is also a maritime historian, did not quickly reveal the true nature of the vessel. As late as Thursday morning, June 15, maritime experts such as Karl Kortum, director of the National Maritime Museum at San Francisco, Harlan Soeten, curator of the Maritime Museum, and Harry Dring, supervisor of the historic ships at the same museum, were unable to identify, from what could be seen, even the general nature of the hull or the types of wood used in its construction. The wood samples first examined appeared exotic. As it turned out, one sample came from a "sport" futtock made of maple, while the two other samples came from yellow pine planking and ceiling. Though these identifications came much later, it was obvious from early examination of construction techniques that the vessel was almost certainly not of West Coast origin.

It was only late on Thursday afternoon, as the cleaning out of the bay mud that filled the lowest part of the hull progressed, that it became obvious (as the photographs show) that the ship was indeed a round-bilged vessel, rather than some exotic scow or barge.

What is the Ship: By Friday, June 16, the remains of the hull lying athwart the sewer excavation were sufficiently cleaned up to permit useful inspection by archaeologists of the State Water Resources Control Board, State Office of Historic Preservation, and the Interagency Archaeological Service. What had been determined by this time was: (1) that the ship was old--almost certainly built before 1870 (perhaps as early as the 1840s or 1850s); (2) that she was probably of East Coast or foreign origin; (3) that she was probably a sailing vessel; (4) that she measured upwards of 150 or 200 tons, perhaps 300 tons or more; (5) that the hull was chewed up almost down to the turn of the bilge, but that higher portions of the vessel appeared at the extreme ends of the part excavated.

The details supporting some of these conclusions, such as the probable age, will be discussed later. What was essential to the decision-making process vis-a-vis handling of the remains and continuation of the sewer construction was that nothing approaching any reasonable identification of the type, exact origin, or specific age of the vessel seemed likely to be achieved within a few days or even weeks. It is difficult to say what the on-site decision regarding the question of immediate, more extensive archaeological investigation of the vessel might have been had a week been taken to bring in East Coast maritime authorities such as William Baker of the Massachusetts Institute of Technology. An important question at the time was the plain matter of how much real information might be gained from such consultation as against what would obviously have been rapidly mounting costs of delay in the sewer construction.

In retrospect, as it has become clearer that the vessel was definitely older and of considerably greater importance to both regional and national maritime history than could have been known at the time of the discovery, it may be said that time should have been taken, even at the cost of delaying construction, to seek opinions from experts who were detached from the immediate pressures of construction schedules. The same decision to remove the heavily damaged portion of the ship in the path of the sewer probably would have been made, but a more widely shared weight of expert opinion would probably have been less sensitive to the possibility that the find would prove less impressive than the total cost of construction delays.

Decision to Remove a Section of the Ship: The meeting of Friday, June 16, with representatives of the Wastewater Program and Environmental Protection Agency, the historians and archaeologists, and the representatives of cultural resources reviewing agencies was held less than two weeks after the passage of the nationally known California Proposition 13, and the shadow of this decision to cut back on all government spending that might be considered frivolous by the larger public lay heavily on the minds of those making the decision as to what to do about the ship in King Street, already known variously as "the ancient vessel in King Street" or "the old scow in the sewer."

In the "Spirit of 13," as it has come to be known, expectations about the value of vessel were lowered, and a prudent program was decided upon which called for the removal of the largest intact section practicable, together with a follow-up program of historical research and, if necessary, field excavation leading toward identification of the vessel.

Identification of the King Street Ship

The report that follows deals with the identification of the ship, the problems encountered in this process, the knowledge gained, the historical setting of the location of the find, the probable time at which the ship was sunk there, and the historical background about the type of ship she represented. From the outset it was understood that identification was not restricted to a perhaps fruitless search for the name of the vessel. The name, of course, would be an open sesame to an entire individual history, as in the case of a person. Identification of the name would short-cut all kinds of laborious investigation and sometimes uncertain speculation. However, inability to track down the name would not preclude developing important information that could distinguish this vessel from the many thousands of ships that visited or sailed out of San Francisco during the latter half of the nineteenth century. For example, to start with we knew that this was **not** a vessel built on the West Coast, a fact which "identifies" it to a degree.

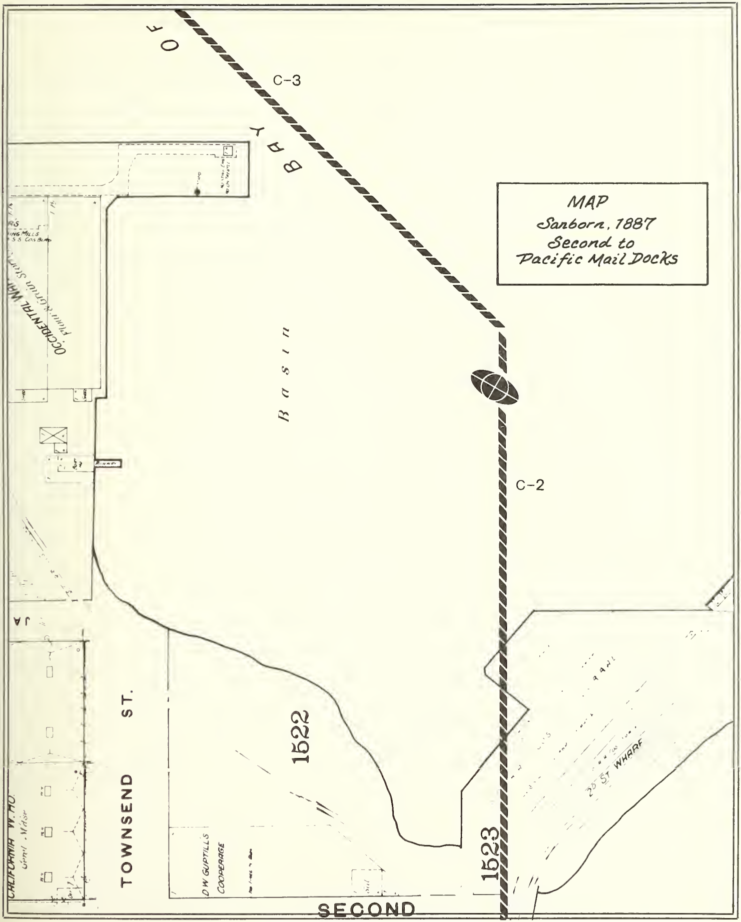
In the description of the processes that followed, it will be seen that field work and direct observation have gone hand in hand with analysis and archival study, each furthering the other. The end results include drawings showing historical reconstructions of the vessel, a determination of the vessel's significance, and a program for future field work and research.

THE HISTORICAL SETTING OF THE DISCOVERY SITE

The place where the old ship lies in the mud of San Francisco Bay was about 300 feet due east of Tichenor's Marine Railway, as it appeared in 1867, and about the same distance southwest of the Pacific Mail Dock built in that same year (see Map 4.01). It was almost 300 feet due north of the northern side of the Central Pacific ferry slip, constructed in 1872, and about 275 feet south of the Pacific Mail's coal wharf. This was squarely in the middle of some of the most important and active marine installations on the San Francisco waterfront during the last half of the nineteenth century and the first years of the twentieth century. That an obstruction the size of a ship should lie in such a location was startling, to say the least. However, not all of the aforementioned activities were coextensive in time, and a reexamination of the sequence of historical developments in the area was started by the investigating historians even while the initial excavation and removal of the ship section were going on.

The Gold Rush and Tichenor's Ways (1851-1867)

The shipyard known as Tichenor's Ways, just to the east of the site of the King Street Ship, is seen on the first accurate topographic map of the Gold Rush of San Francisco--the U.S. Coast Survey Chart of 1852, the field work for which was completed in February of that year. Map 4.02 shows the marine railway just east of the intersection of Second and Townsend streets, with its tracks and work shed built on a little tongue of fill taken from the steep bluff that formed the eastern and northern side of Steamboat Point. This, a detail from the 1853 edition of the Coast Survey, included the depth of water, as well as the topographic information of the original 1852 chart. The line of King Street (the C-2 sewer) is superimposed on the chart; the location of the ship is indicated by the arrow. The dotted contour lines in the water to the east of the marine railway indicate 12-foot (2 fathom) and 18-foot (3 fathom) curves. The numerals inside the 2-fathom curve show depth of water in feet; those outside the 3-fathom curve show depths in fathoms. The King Street Ship



Map 4.01: Detail from 1887 Sanborn Map. . .showing Pacific Mail Basin.

lies approximately athwart the 3-fathom curve (18 feet). If the ship had been lying in this position in Gold Rush days, the hull would have been completely covered by water at high tide, perhaps slightly exposed at low tide.

Henry Tichenor's Ways: By 1851, although there were suddenly hundreds of vessels of all sizes and types operating into and out of San Francisco, the city had no facility for hauling or dry-docking vessels for bottom-cleaning, caulking, coppering, or for accomplishing other below-the-waterline repairs. A small schooner might be beached at high water and worked on when the tide ran out, but the tidal range at San Francisco is inadequate to use this time-honored technique for vessels drawing more than five or six feet of water. South Beach, near Steamboat Point, would have been a likely place to do such work; the gentle slope of the shoreline below high water was about right for the purpose.

To meet an obvious need, Harry B. Tichenor constructed a marine railway at the foot of Second Street in 1851. A marine railway, then as now, consisted of tracks laid out into the water from above the high tide line. Tichenor's original railway may have used railroad iron or may have employed flat iron on top of the timber ways. To haul a vessel out of the water, it was maneuvered onto a stout, iron-wheeled cradle, which was drawn up the inclined railway by a windlass or capstan (see Figure 4.02).

Tichenor had begun his business life in the wholesale-commission house business in New York. As reports of the great profits being made in this line of business in San Francisco became common knowledge in New York, Tichenor formed a partnership with Firman Neefus, who would remain in New York while Tichenor operated at the San Francisco end. This was a classic and successful pattern of commission merchant operations during the Gold Rush period, when skillful and immediate decisions (under conditions of slow-paced communication and fast-paced business) had to be made at both the New York and San Francisco ends of the 18,000 mile lifeline to California.

Tichenor arrived in San Francisco in April of 1850, achieved early success, and quickly expanded into the coastal shipping trade and lumber business. This involvement with all classes of shipping may have suggested to him the idea of the profits to be made from a ship repair facility. He bought the lot (actually a small block) at the northeast corner of Townsend and Second at one of the famous--or infamous--"Peter Smith sales," probably that of June 14, 1851. His "mug-book" biography (presumably supplied by him) states that he paid $2,700 for his block, the highest figure paid for any of the properties at that sale (**Calif. Biog.:** 1402). This was indeed a bargain, for a couple of years later William Jewett paid $40,000 for the water lot of about the same size diagonally across the intersection of Second and King (Denny 1853: 105).

The site was an excellent one for the purpose, being partly on land and partly water. Again, it is at this place on Steamboat Point that deeper water is closest to shore and the length of the railways might therefore be least. Bancroft says that the railway was completed in the summer of 1851, when the brig **Sidi Hammet** was hauled and her bottom coppered (Bancroft 1889: vii, 79).

The Changing Scene at Tichenor's Way: The Coast Survey chart of San Francisco executed in 1857 showed wonderous changes in the city front. Yerba Buena Cove, the anchorage of the Argonauts of '49 and '50, had been completely filled in or closed off by advancing streets and piers. But around Steamboat Point, the most conspicuous geographical change was the landfill accompanying the expansion of activities at Tichenor's Ways. Map 4.03 shows the same section of San Francisco as Map 4.02. The survey was completed in the summer of 1857; the map shown was published in 1859 and it is the same as the 1857 printing, except that it again adds depths of water.

The 1857 map shows that Tichenor had built a new and presumably larger railway at a somewhat different angle than the first one. The sanded area with the buildings on it, at the foot of the steep hill at the northeastern end of Steamboat Point, was all fill for Tichenor's ship repair and ship building operation. The curious angular indentation north of the ladder-like symbol for the railway was for slipways where coasting schooners and other vessels were built or rebuilt.

Thomas Houseworth, the noted San Francisco stereopticon photographer of the 1860s, made views of the scene at Tichenor's Ways in 1864, almost certainly at the same time that he went out to photograph

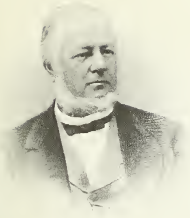
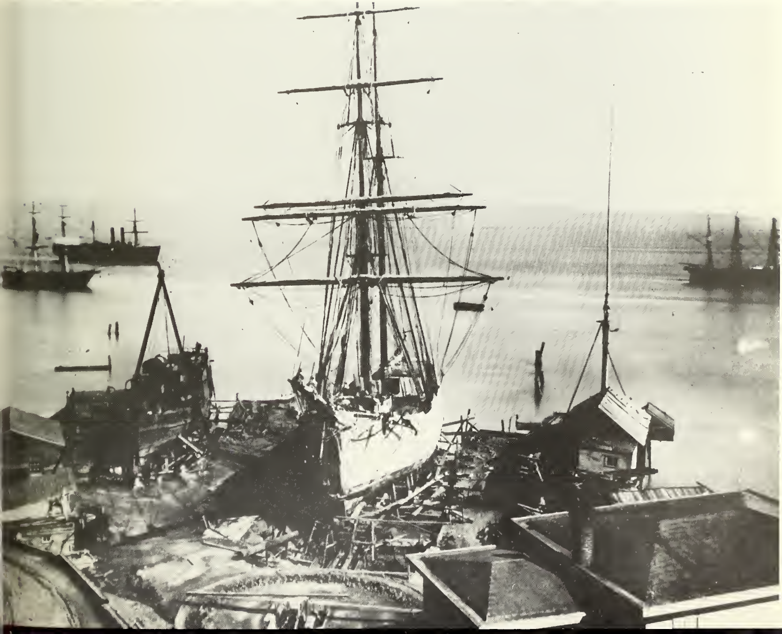


Figure 4.03: **Portrait of Tichenor in his later prosperous years as a lumber dealer.** . .He turned a tidy profit from the sale of his strategic waterfront yard as well. (Bancroft Library).

Figure 4.02: **The Hesperion on Tichenor's Ways in 1865.** . .About 300 feet from the site of the King Street ship, H. B. Tichenor operated his shipyard until 1869. The strange craft to the right with the cabin built on top may be the hulk shown in the manuscript sounding chart of 1857.



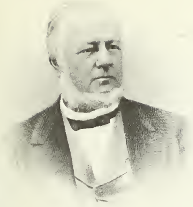
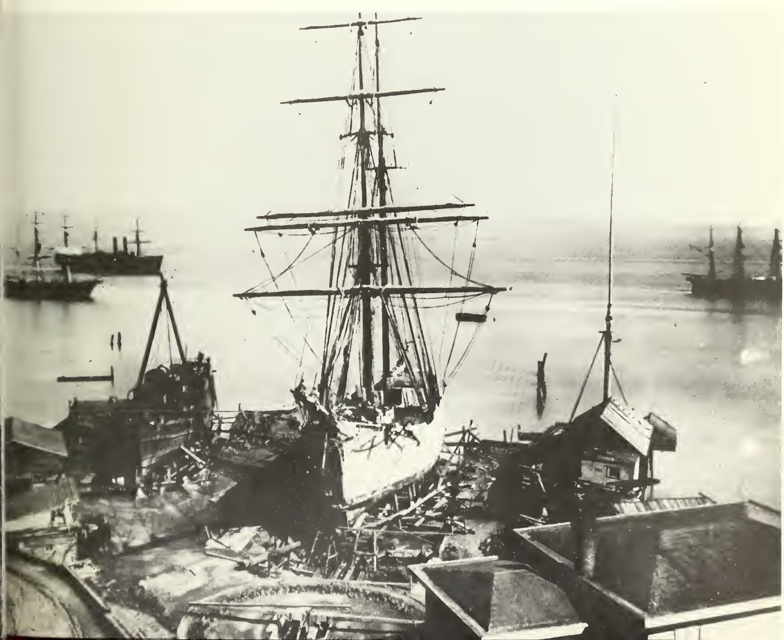
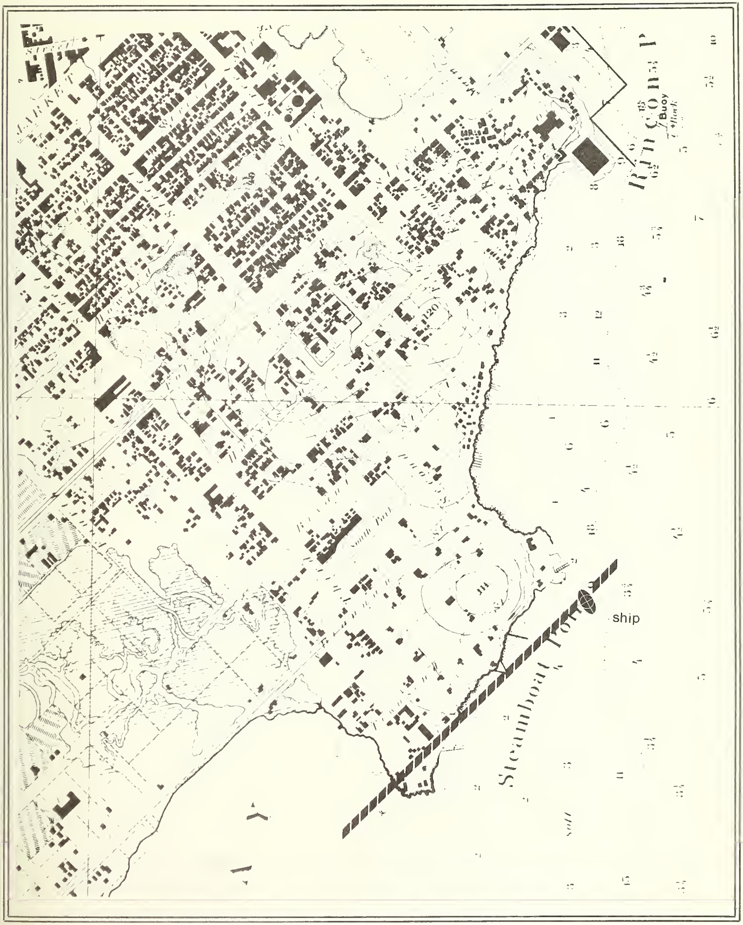


Figure 4.03: Portrait of Tichenor in his later prosperous years as a lumber dealer. . .He turned a tidy profit from the sale of his strategic waterfront yard as well. (Bancroft Library).

H. B. Tichenor

Figure 4.02: The Hesperion on Tichenor's Ways in 1865. . .About 300 feet from the site of the King Street ship, H. B. Tichenor operated his shipyard until 1869. The strange craft to the right with the cabin built on top may be the hulk shown in the manuscript sounding chart of 1857.





Map 4.03: Detail from 1859 U.S. Coast Survey Map. . .showing Steamboat Point.

the launching of the Civil War Monitor **Comanche** at the foot of the Third Street in November of 1864 and the installation of her huge 15-inch guns in December of '64. Figure 4.02, showing the marine railway with the brigantine **Hesperion** hauled out, and a small steamer alongside having her boiler hoisted by a pair of shearlegs athwart the vessel, was taken in the winter light of one of these 1864 excursions. The capstan used to haul vessels up the railway is seen in the foreground--unfortunately without the mules harnessed to its long arms. The buried foundation for what was probably a smaller capstan of this type was uncovered by the Wirth Associates archaeological team digging in King Street near the southern shore of Steamboat Point in 1979 (Wirth Associates 1979: 18-21).

A rutted curving roadway down from the bluff to the filled land is seen at the lower left corner of Figure 4.02. Houseworth carried his equipment down this roadway to make the view seen in Figure 4.04, misdated by a turn-of-the-century copyist as 1870. The fill here was perhaps more extensive than that shown on the 1857 map. Figure 4.04 is taken looking almost due north to the Marine Hospital near the tip of Rincon Point. St. Mary's Hospital is the other large brick building at the far left, overlooking South Beach, as the stretch between Steamboat Point and Rincon Point was known. All kinds of vessels, from scow schooners to large ocean steamers, can be seen at anchor in these two views. The sails of a schooner and a sloop, both of them drawn up on the small "greaseways" that lined the beach, can be seen beneath the bluff of Rincon Hill. The scatter of randomly located shacks below St. Mary's Hospital marks the Chinese fishing village of the 1850s and early '60s.

The picture was taken at low tide, and it can seen that a mudflat extended from the foot of the bluff to a line between the camera and the Marine Hospital. This mudflat roughly follows the innermost dotted line seen on the 1857 chart (Map 4.03). The slope to deep water along South Beach was entirely too gradual to provide very favorable conditions for a marine railway that could take ships as large as those hauled up at Tichenor's Ways.

The great amount of activity at Tichenor's Ways, with large vessels being maneuvered into position for dry-docking and with still larger vessels anchored near the three-fathom line, all suggests that a sunken hulk, like the King Street Ship, would not have been left as a hazard to navigation and normal maritime operations. A more detailed look at the depths of water obtaining in 1857 is seen in Map 4.04, a copy of the Coast Survey Manuscript Chart of Soundings taken for the 1859 issue of the San Francisco map. This manuscript chart suggests that there may have been some shoaling of the water since 1853, perhaps as a result of the large piers around Rincon Point. But the location of the King Street Ship was still in rather deep water--10-18 feet. This depth is such that the vessel would have been visible at low tide, and it would almost certainly have appeared in photographs or in one of the meticulous birdseye views executed during the 1860s. The ship absolutely was not present in 1857, when the soundings were made, for it would have been clearly marked as an obstruction. This manuscript picked up and identified another ship hulk located alongside the fill at Tichenor's Ways (see the outline of a ship on Map 4.03) at the southern edge of Tichenor's fill; this melon-seed outline was identified, "Ship," on the hydrographic manuscript, Map 4.04, as are two "Hulks" at the outer edge of the Rincon Point wharf and warehouse.

The location of a hulk at Tichenor's in the mid-1850s was a matter of fleeting interest vis-a-vis the sewer line at the time that the 1977 report on the C-2 alignment was written. But what became of this hulk, less than 300 feet from the ship encountered in King Street? A closer look at Figure 4.02 suddenly reveals what would probably never have been observed in this photograph--a photo that has been published several times, has been used in exhibitions, and was carefully restudied as recently as the above-mentioned discovery of the Steamboat Point capstan foundation by Wirth Associates. The shed at the right of the **Hesperion,** with its odd attached lean-to's and its towering flagpole, has been built on the deck of the hulk identified by the Coast Survey on Map 4.04. The copy negative of the original photograph made by T. E. Hecht 70 or 80 years ago was unduly "contrasty," and the outline of the bow has been almost lost in a black blur. The flagpole is supported by the lower mizzen mast of the vessel.

What became of this hulk? It appears in 1857 on the manuscript survey and in the summer of 1864 in Figure 4.02. It is almost impossible that it was pulled away from this location, as a minimum of seven years

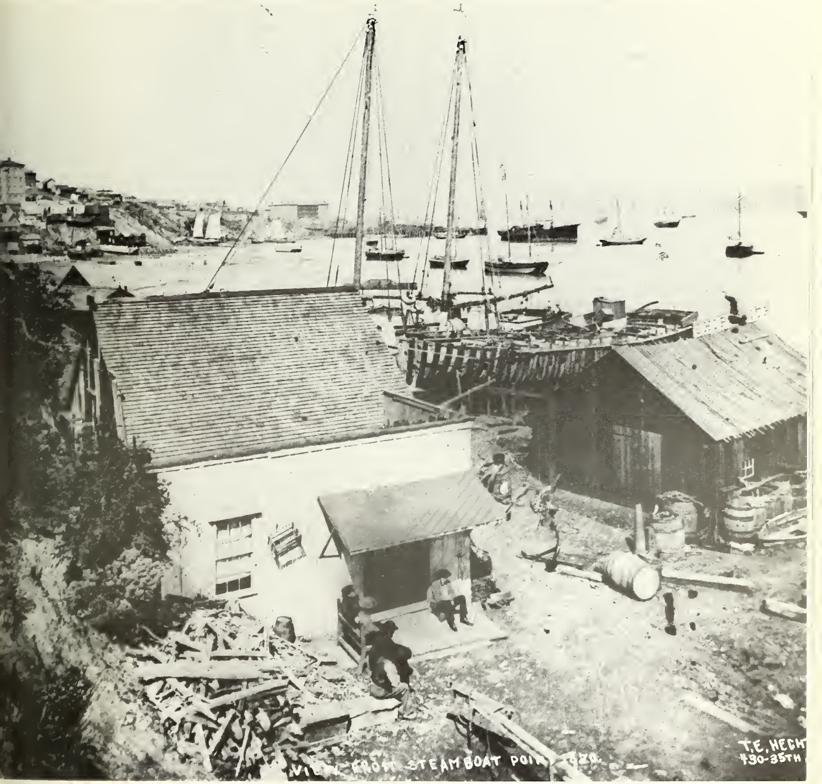
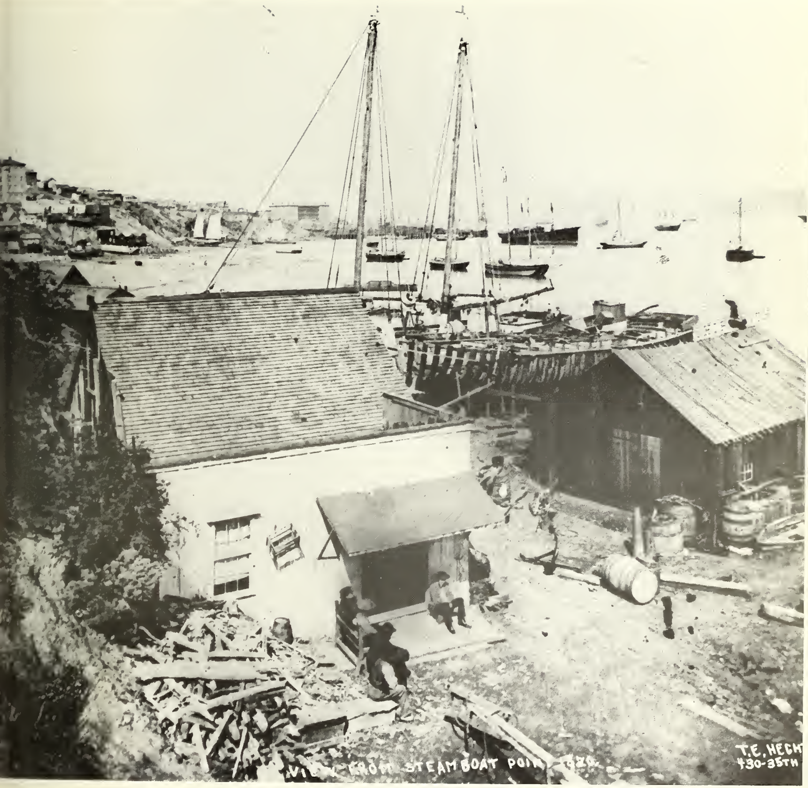


Figure 4.04: South Beach from Steamboat Point. . .Tichenor's Ways is out of sight, to the right of the shed with the sign "SHIPSMITH" on its roof. A new schooner for the coastal trade is abuilding next to the smithy. In the background is the long stretch of South Beach's mudflats exposed by low tide. (Bancroft Library)



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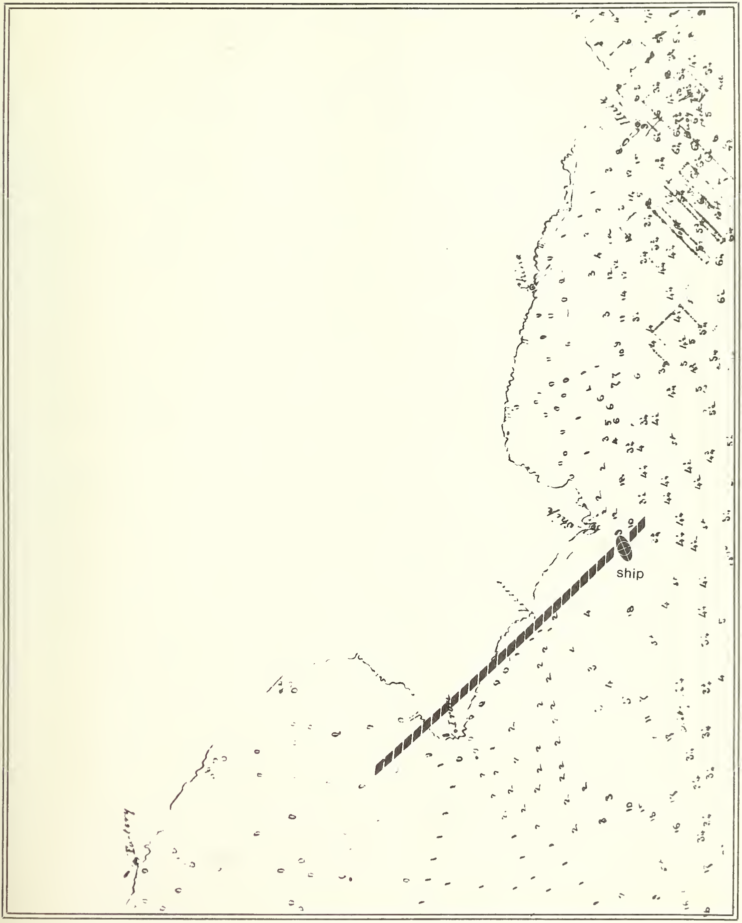


Map 4.04: Detail from 1857 U.S. Coast Survey Manuscript Map. . .showing sounding chart.

exposure to the ravages of ship worms would have made it virtually unfloatable. Presumably it was cut down in place and filled over. However, this likelier possibility is called into question by the other pictures. Figure 4.05, taken in 1868, shows the latter days of Tichenor's Ways. In this view the line of the ways is directly across the photograph. The steamer in the foreground (with its smokestack and pilot house at the far left) is on the marine railway. Just beyond it is William C. Ralston's steam yacht **Brisk,** cut in half to be lengthened to receive larger boilers (North 1899: 143-153). Visible through the cut-out section is the water and the bows of the new ferry steamer **Alameda.** Apparently the **Brisk** is sitting almost on top of the location of the early hulk. Given this progression of land use, the 1857 hulk would most probably have been towed away if it were at all possible to float her. If it were cut down in place, the remains of this ship would presently lie about 100 feet due east of the southeast corner of Second and Townsend Street, and some 200 feet west of the hull encountered by the sewer.

If the 1857 hulk is sketched on a modern map of San Francisco, together with the outline of the King Street Ship, it would be seen that the alignment of the 1857 hull falls almost directly on the projected line of the keel of the King Street Ship. But there is yet another remarkably detailed pictorial source of information about the development of this site during this late 1860s. Figure 4.06 is a painting by the meticulous marine artist Joseph Lee. This view looks from the Pacific Mail Dock south to Tichenor's Ways in 1857, while yet more filling-in was taking place. The two-masted schooner on the right hand side of the painting is drawn up on Tichenor's Ways--and there is no sign of any partially submerged hulk in the water 200-300 feet behind her. Indeed, the detail of the painting clearly shows the marked out channel to the ways, which would have been obstructed by such a hulk. Incidentally, the much longer piling-marked approach to the ways than is seen in Figure 4.02 probably indicates a substantial degree of shoaling in the water as a result of piers at the foot of Second Street and the beginning of filling construction activities for the building of the new Pacific Mail Dock.

The Pacific Mail Steamship Company began building its new pier in San Francisco at the foot of First Street in 1866 (Municipal Report 1865: 218; 1866: 244-245). Previous to this time the Pacific Mail steamers, which provided the most important single service for passengers, treasure, fast freight, and mail between San Francisco and New York (via the overland link at the Isthmus of Panama), had landed at piers on the central waterfront, although major facilities of the company, including the great repair shops which were the first major industrial installation in the state, had been at Benicia. With the rapid progress in constructing the Central Pacific Railroad after the close of the Civil War, it was obvious that the Panama road to the East would soon no longer be one of the world's prominent moneymakers. At the same time the increase in size of ocean steamships, the beginnings of trade with Japan, and the transcontinental connection soon to be offered by the railroad itself moved the steamship company to lift its horizons to the inauguration of the first trans-Pacific steamship service.

The company ordered four giant new sidewheel steamers, the largest of their type that had been constructed, and in anticipation of the opening of the Oriental Route began construction of a great new pier of its own in San Francisco, together with warehouse and repair facilities to replace those at Benicia. The new pier and the cutting and filling operation associated with the new construction completely changed the face of the old South Beach area just north of Tichenor's Ways. As Langley commented:

> The improvements made and in progress under the direction of the company have changed topography of the western front of the city. The company owns a block of over-flowed lands bounded by First, Second, Townsend and Brannan Streets, twelve 50-vara lots. They have constructed wharves which require 1,200 piles, 3,000,000 feet of sawed lumber, 35 tons of iron bolts and 300,000 cubic yards of earth to complete (Langley 1867: 14).

The physical changes wrought by the development, as compared to the shoreline and buildings seen in the chart of 1857 (Map 4.03) and the photograph of 1864 (Figure 4.04), are graphically displayed in the new Coast Survey Map of 1869 (Map 4.05) and the birdseye view of 1868 (Figure 4.07). The 1869 Coast Survey Map was based on survey work done in 1867

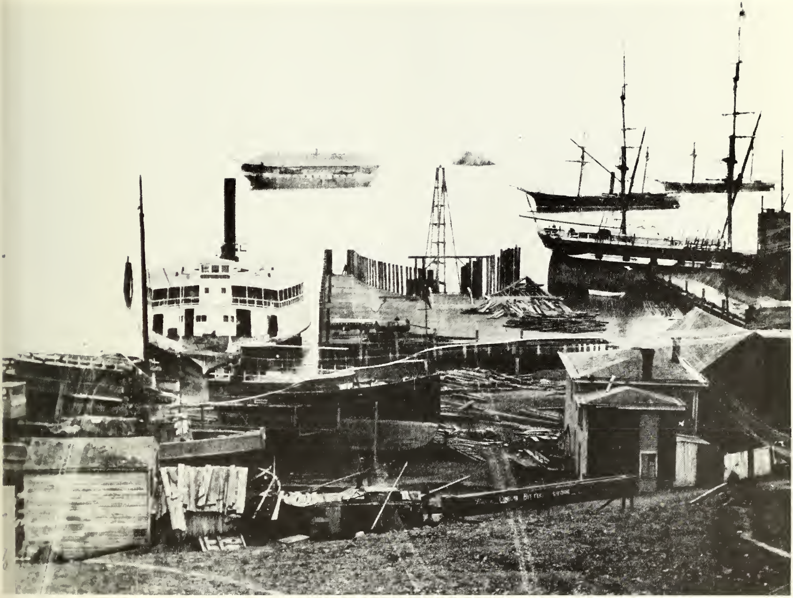


Figure 4.05: Tichenor's Ways in 1868. . . .The photograph is dated by the brand-new double-ended ferryboat **Alameda** alongside the new slip. She was the first of her type on San Francisco Bay. In front of her, William C. Ralston's steam yacht **Brisk** is up on the way, cut in half to receive new boilers. Soon the huge new ferry slip for the Central Pacific's railroad car ferry would take over the site of this first major San Francisco ship repair facility. (National Maritime Museum at San Francisco)

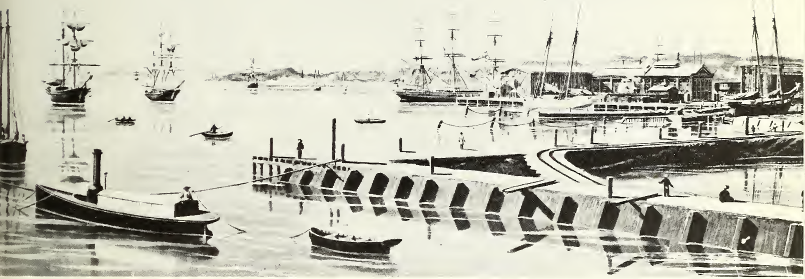
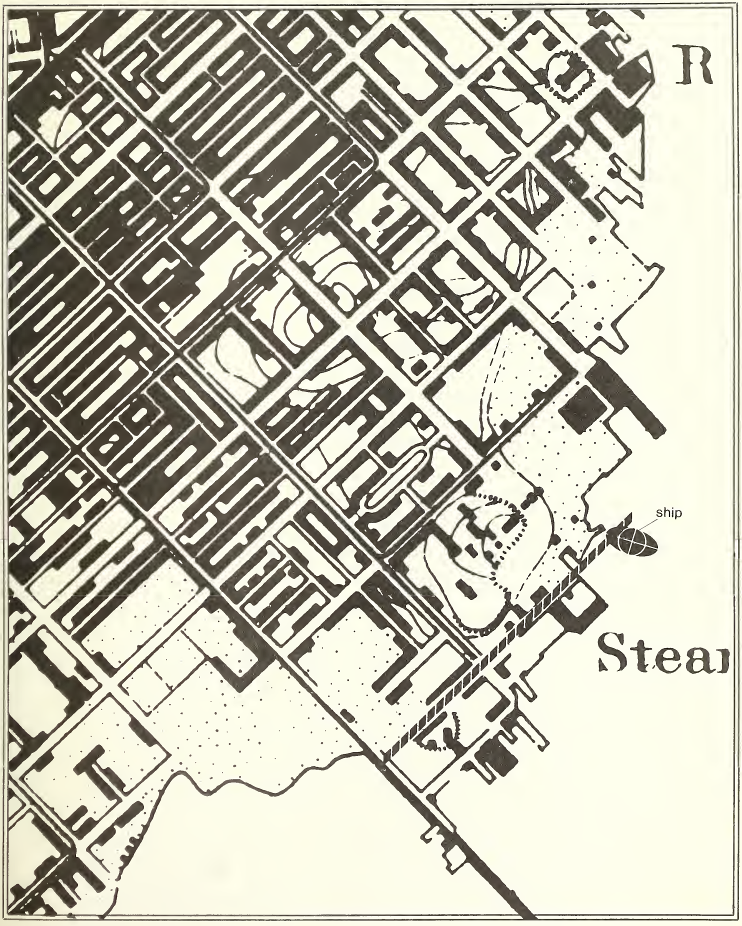


Figure 4.06: Joseph Lee Painting of the Pacific Mail Basin, 1867. . . .This meticulous marine painting shows a ship on Tichenor's Ways, the just completed brick Gas Works to the left, and the channel leading to Tichenor's Ways marked by pilings. The view is from the new Pacific Mail Dock and in the foreground and center is the bulkhead erected for filling the land northwest of First and Townsend streets. (California Historical Society)



Map 4.05: Detail from 1869 U.S. Coast Survey Map. . .showing Steamboat Point.

and 1868. The Pacific Mail Dock and the adjacent Oriental Warehouse (the latter still extant) gave their address as First and Brannan Street, but the Mail Dock already extended to the south line of Townsend Street. Tichenor's Ways is still shown on this map as the small northeastward projection near the end of the overlaid King Street sewer alignment. The old shoreline roughly followed (a few feet to the east) the first 20-foot contour line seen on the map between Steamboat Point and Rincon Point. The sanded (or dotted) land area north and south of Steamboat Point, including the entire area between Tichenor's Ways and the Oriental Warehouse-Pacific Mail Dock area, was new fill.

The birdseye view, Figure 4.07, gives a wider three-dimensional impression of the changes than can any single photograph. This particular view, executed by C. B. Gifford, is astonishingly accurate in its details, right down to architectural features and delineations of particular ships. For example, the station ship **U.S.S. Independence**, anchored between Tichenor's Ways (1) and Mission Rock (2), shows clearly in Figure 4.05 of the same year. So detailed is Gifford's view, that it may itself be dated as prior to August of 1868, because the new ferry slip seen in Figure 4.05 does not appear. The Pacific Mail Dock is seen at point (3). We will not undertake to identify the steamer departing from the dock, or the other Pacific Mail Steamer (4) approaching past the city front--but they could be identified by comparison with photographs. A ship is drawn up on Tichenor's Ways, and the belching smoke stack of the Pacific Oil and Lead Works on King Street is seen just beyond it (5).

To gain a specifically detailed closeup of the area between the Mail Dock and Tichenor's Ways it is instructive to refer back to Figure 4.06, Joseph Lee's painting. Now it can be understood that the curious bulkhead in the foreground with the curving railroad spur across a still water-filled lot shows the area on the north side of Townsend Street that was soon to be occupied by the Occidental Warehouse and workshops of the Pacific Mail Company. This bulkhead line along the north side of Townsend Street essentially remained the limit of fill toward King Street and the ship site through the remainder of the century as is shown in Sanborn maps up to 1905, just before the completion of Section 13 of the seawall. The physical change at the ship site itself caused by the construction of the Pacific

Mail Docks (1867) and filling operations north and south of the site would perhaps have been a rapid silting-up of the formerly 18-foot-deep location. On the other hand, dredging operations would have been undertaken whenever necessary to keep at least that depth of water in the neighborhood of the Pacific Mail Dock itself.

The Central Pacific Car Ferry Slip: The transformation of Tichenor's Ways dates from 1868, when a slip for the Oakland Ferry (see Figure 4.05) was built out from the foot of Second Street. In the case of the **Central Pacific Railroad vs. Alfred A. Cohen** (October 1876), Cohen testified that he had built the ferry slip (here seen under construction) in August of 1868 at a cost of about $14,000. Cohen was involved in this suit with the "Big Four" of the Central Pacific because of a falling out amongst probable thieves. On the first of August, 1868, Cohen, W. C. Ralston, and others bought up three-fourths interest in Tichenor's block at the foot of Second Street for $200,000. In October of 1869, C. P. Huntington negotiated a lease with Tichenor for half of the block, with an option to buy the whole block for $250,000. A year later the railroad moguls picked up their option, in the interest of making the foot of Second street their terminal for freight cars brought over from Oakland by ferryboat. The law suit which brought forth the details of the transactions and the construction on this property was occasioned by the Central Pacific's claim that Cohen had defrauded them by pocketing the $50,000 difference between the 1868 price and 1870 price.

More dramatic changes in the site of Tichenor's Ways at the Foot of Second Street date from this purchase by the Central Pacific interests. Langley's **City Directory** for the year commencing April 1871 commented as follows regarding the "great changes at the Foot of Second Street" in the past year:

> Substantial wharves have been built, upon which a capacious shed of several hundred feet in dimensions has been erected. Within this the necessary offices of the company have been made and over the wharf runs a labyrinth of tracks conveying one on an adjustable apron which can be raised or lowered as to permit cars to go from the deck of the steamboats by which they are transferred with their cargoes to the main track on the opposite side of the Bay. . . . The works are

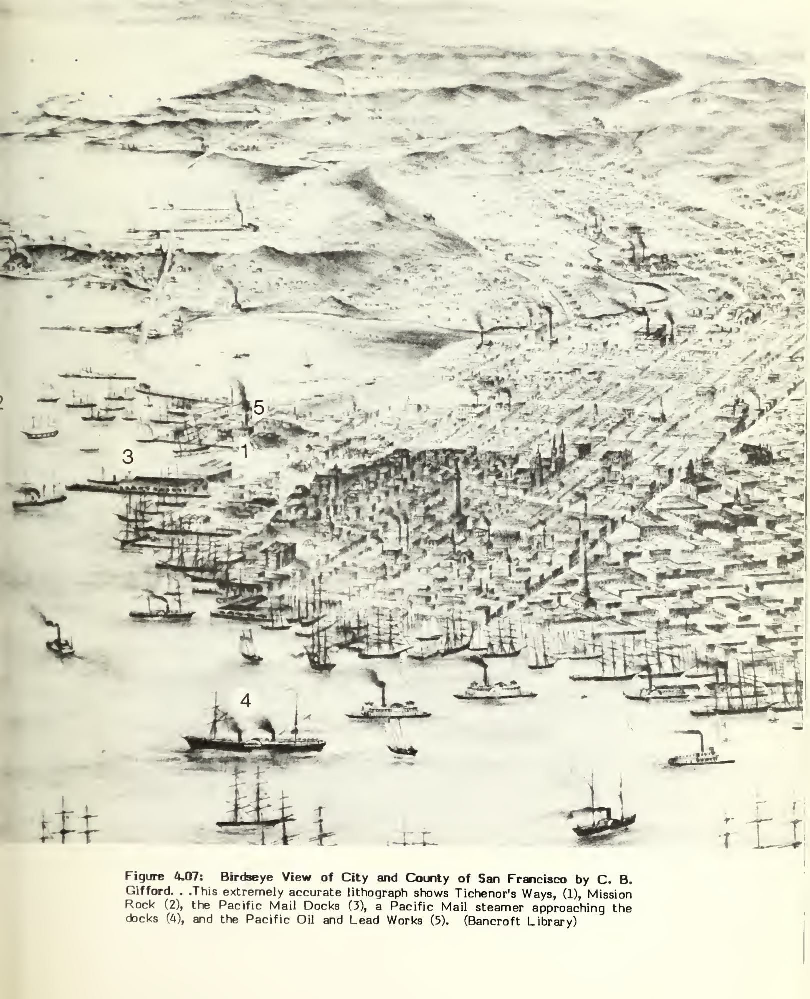


Figure 4.07: Birdseye View of City and County of San Francisco by C. B. Gifford. . .This extremely accurate lithograph shows Tichenor's Ways, (1), Mission Rock (2), the Pacific Mail Docks (3), a Pacific Mail steamer approaching the docks (4), and the Pacific Oil and Lead Works (5). (Bancroft Library)

> extensive and answer the purposes designed but do not constitute such a depot as is worthy of the great transcontinental road or of the Metropolis of the Pacific.

A year later, the situation had not improved:

> The Pacific Mail Steamship company occupies the Wharf at the foot of First Street and the freight depot of the Central Pacific is at the Foot of Second. These great transportation companies, among the most important in the world, have but slight and quite inelegant structures for the terminal depots of their extended routes. Capacious sheds have been erected protecting passengers, employees, and goods from wind and rain. . .but they do not give full accommodations for the great traffic nor are they architectural ornaments to the city (Langley 1871: 15-16).

This wharf and the adjoining basin of the Pacific Mail Steamship Company docks remained very much as they appear on the 1887 Sanborn map (Map 4.01) (with some improvements and fill to within 50 to 150 feet north of the alignment near Second Street) down to the building of the seawall in 1904-05. The location and approximate size of the King Street Ship relative to the Pacific Mail Basin has been added to this 1887 map, together with the C-2 and C-3 sewer alignments.

The Pacific Mail Dock was photographed C. E. Watkins in 1871, and two of his views, Figures 4.08 and 4.09, show the basin between the wharf at the foot of First and Second streets. Figure 4.08 shows the main pier being extended from the length seen on the 1869 chart (Map 4.05) to that appearing on the 1887 Sanborn Map (Map 4.01). The water frontage of the wooden Occidental Warehouse (center, with the triple-peaked roof) marked the line of Townsend Street. The famous Gold Rush riverboat **Senator**, by then a coastal steamer, is the vessel nearest the camera; she lies alongside the comparatively short coal dock. The much larger steamer beyond, with the white upperworks, lies alongside the Mail Dock proper; she is one of the four giant wooden sidewheelers (360 feet long) built to initiate the trans-Pacific run--the **China, Japan, American**, and **Great Republic.** If a line were drawn from the peaked roof of the Occidental Warehouse and extended out 300 feet (past the right edge of Figure 4.08), we would have the precise location of the discovery of the King Street Ship, as can be verified by reference to the 1887 Sanborn (See Map 4.01).

C. E. Watkins made another view of the Oriental Warehouse (Figure 4.09) in 1871. The still extant sign of the Oriental U.S. Bonded Warehouse, then owned by Howard and Pool, faced on Brannan Street. Coal for firing the big steamers was piled in back of the Oriental Warehouse, where the raised trestles for the coal cars can be seen, curving off to the right. Beyond the Pacific Mail repair shops, which faced on Townsend Street, and the Basin itself, the construction of the Central Pacific ferry slips was complete, and clusters of pilings can be seen behind smokestacks of the steamers pulled up alongside the bulkhead of Townsend Street.

A Muybridge view, taken in the late 1860s, gives a clearer view of the big sheds that marked the Pacific Mail Steamship Docks at the corner of First and Brannan (Figure 4.10). Through these sheds passed the thousands of Chinese that immigrated to California. Coming as crews or as steerage-class passengers, they first glimpsed the Western world at this crowded intersection.

Unfortunately, none of the views that Watkins or Muybridge make around the Pacific Mail Dock showed the exact site of Tichenor's Ways and what activity may have been going on in this last brief period before the Central Pacific ferry slip operation made the site unuseable for major ship building and repair. It is in these brief periods of transition and change that all kinds of artifacts, including sometimes startling and unexpected anomalies, are apt to be abandoned and interred in fill. (It is precisely at the moment that the piped water system is installed that the householders throw the collected refuse of the attic, basement, and backyard down the well.)

In sum, the amount of activity at Tichenor's Ways in its heyday, as well as the extensive photographic, cartographic, and archival search, seemed to remove from the realm of plausibility the theory that the King Street hulk dated to the prime years of the Ways. The possibility remained, however, that the ship caught fire while she was being repaired at the Ways, and was pulled away from the Marine Railway at a time when the ship repair operation at the Foot of Second Street was going out of business--and hence an abandoned hulk would not have been a problem for Tichenor. It would, however, surely have been a nuisance to the expanding Pacific Mail Dock operation whose tugs **Sea Witch** and **Rover** maneuvered

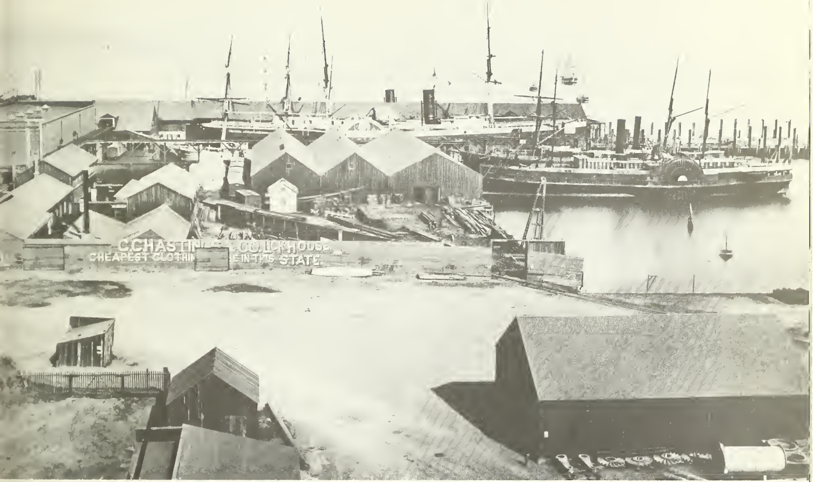


Figure 4.08: The Pacific Mail Dock, 1871. . . .When C. E. Watkins made this view, the main wharf was being extended to its final length. The two coastal and two trans-Pacific and Panama steamers alongside indicate the level of activity associated with the Pacific Mail Basin at the foot of King Street. The Oriental Warehouse is the brick building at the far left, the Occidental Warehouse the frame, peaked-roof structure at the center. (National Maritime Museum at San Francisco)

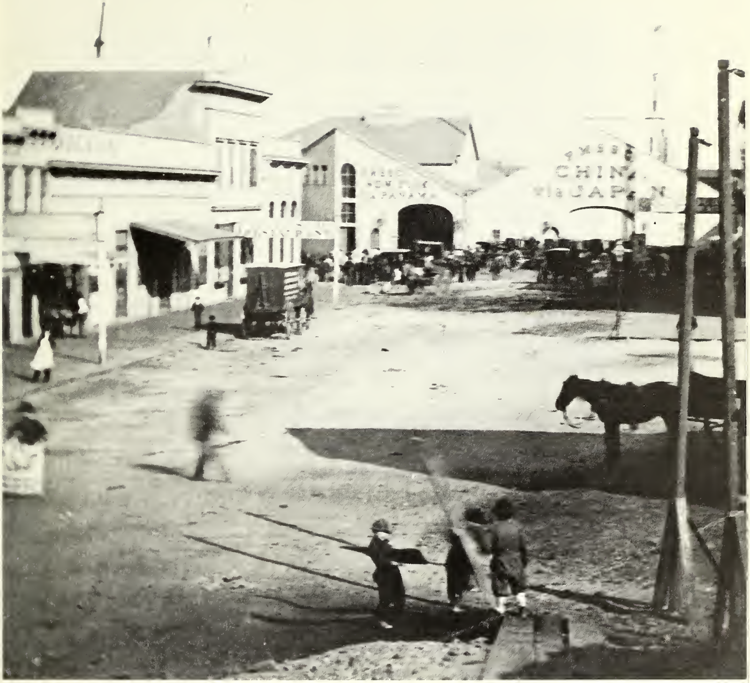
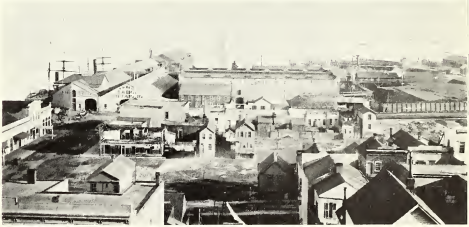


Figure 4.09 (right): The Pacific Mail Dock. . .is seen from the first slope of Rincon Hill near First Street. The sign "Oriental U.S. Bonded Warehouse" is still legible today but the shed-roofed wharves of the Pacific Mail (seen in **Figure 4.10**) are long gone. Over these wharves passed the vast Chinese immigration and it was in the basin of the Pacific Mail Dock that the King Street Ship was abandoned. (National Maritime Museum at San Francisco)



the huge steamers along both sides of its wharf, including the "Little Mail Wharf" (see Map 4.01). Thus, it was possible that the King Street Ship had lain in its location since the closing days of Tichenor's Ways. While seemingly unlikely because the hulk would have been dangerous to later navigation in the area, the possibility could not be ruled out entirely on the basis of any direct photographic or cartographic evidence which had come to light. Only substantial research in the daily press could identify a ship lost in the Basin in these busy later years, and the results of just such a search appear below in the section, **Tracing the Daily Press.**

A Maritime Historian's Perspective, June 16 - June 20, 1978

In contrast to many "instant salvage" programs, the process of excavating and removing an intact section of the vessel was knowledgeably executed because the Principal Historical Investigator was also a maritime historian of the West Coast. During this delicate removal operation, attention focused almost exclusively on the ship remains, not on broader archaeological field techniques and problems. First, very few associated artifacts were found at the site. Second, the degree of disturbed fill down to the lowest parts of the hull made careful notation of the exact levels and character of fill both inside and alongside the hull impossible. Finally, conversations with workmen and observers who have been following the progress of the construction excavation revealed that certain materials --ranging from a case of ginger beer bottles, which might have helped establish a time period for the sinking, through a mast or large spar timber, which would have been equally useful diagnostically -- had been taken away by amateur collectors or dumped with debris removed during excavation by the contractor.

The physical setting of the find itself was far from conducive to satisfactory observation of the remains of the hull. The construction shoring extended down to the bottom of the 20-foot-deep trench, except where portions of ship sides interfered. Figure 4.11 shows the view looking east toward the Embarcadero. As the photograph suggests, the still-hidden sides of the vessel may well extend much higher in the area north and south of the shoring undamaged by the sewer construction excavation. Unfortunately, construction personnel said it would be impossible to remove even some of the wooden lagging in order to see how much of the hull was intact. It was later discovered, however, that bottle hunters who recovered a case of stoneware ginger beer bottles had themselves removed the lagging at night to look for artifacts. Simply pulling out pieces of wooden shoring so as to explore behind the boundaries of the construction excavation would not have been permitted by safety inspectors, and the contractor and the Wastewater Management representatives were reluctant to uncover more of the ship. As in the case of the discovery of the

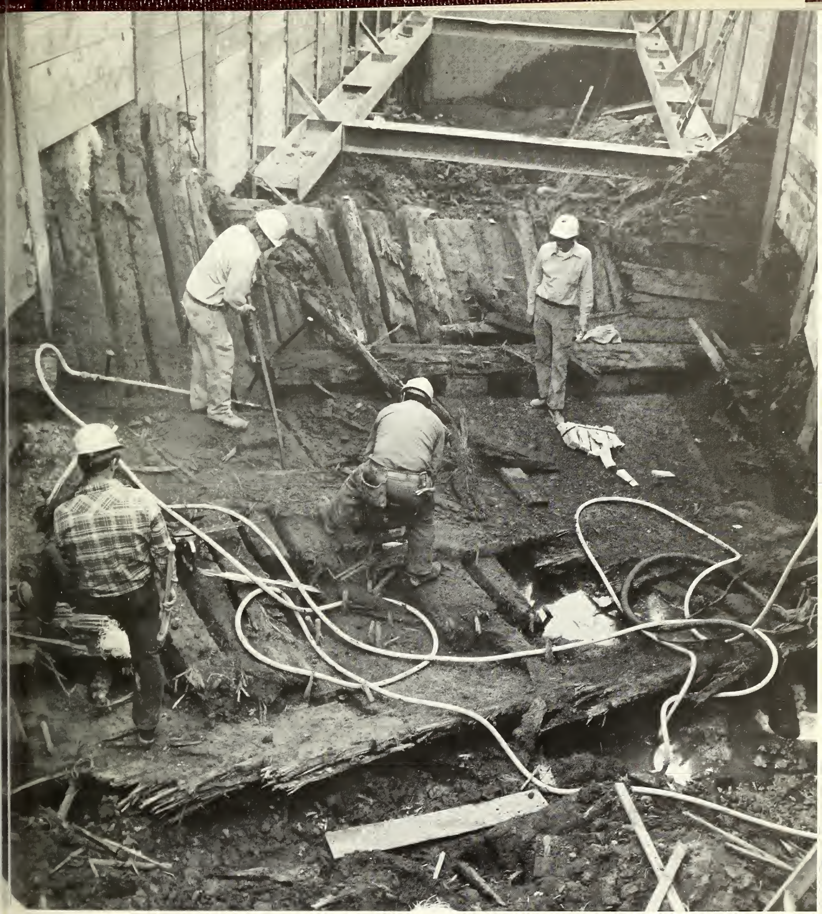


Figure 4.11: The Hull Cleaned Up. . .Seen from above, even after cleanup excavation under archaeological supervision, the remains in the muck did not quickly delineate the nature of the vessel. Note the much higher extension of the hull at the right and left, where it disappears into the sewer walls. (John Kortum)

remains of the famous storeship **Niantic** on a private construction job in San Francisco a month before, decisions involving engineering possibilities were shaped by construction personnel who were eager to get on with their tasks of sewer construction. Later reflection and experience with two other recent waterfront ship discoveries suggest that engineering and scheduling recommendations offered by builders and contractors anxious to resume work should be examined carefully before final decisions are made. It should be noted, however, that the King Street Ship salvage and identification programs have been substantially superior to the two other cases involving Gold Rush hulks from the standpoint of the good faith of the construction operators. Furthermore, federal regulation and funding for mitigation of impact on historical cultural resources may result in a continually improving climate of understanding and responsibility that is not entirely ascribable to the availability of funds for archaeological work.

Excavating the Ship

Initial investigation of the partially uncovered ship lying athwart the C-2 sewer trench presented archaeologists and historians with a variety of tantalizing questions about the age, condition, structural characteristics, and identity of the vessel which lay buried beneath their feet. Unfortunately, so little of the vessel lay exposed within the excavation that a preliminary visual inspection of the remains failed to provide definitive information regarding the vessel's attributes or state of preservation. It must be kept in mind that at the start of the third week of June 1978, opinions about the vessel's most likely attributes and configurations varied widely. One of the construction engineers, a retired naval officer, was convinced that he could see the outlines of a twentieth-century "flat-bottomed barge" in the sewer trench. Other observers, including several prominent maritime historians, could not rule out the alternate possibility that we had chanced to encounter the remains of a deep-draught, ocean-going vessel which had perhaps been built prior to the Gold Rush. In short, while it was clear that the ship represented a resource of great potential importance, an informed determination of significance would obviously have to await the results of further research.

Because all construction had been halted in the vicinity of the ship and would remain suspended pending additional scholarly evaluation of the remains, it was imperative that at least a preliminary assessment of significance be achieved as expeditiously as possible. This would entail a program of archaeological excavation and the unavoidable mechanical problem of removing a massive quantity of soil from around the vessel. In the interest of completing the process of exposing the vessel as efficiently as possible, the Principal Archaeological Investigator decided that most of the soil surrounding the ship could best be removed by mechanical means; hand excavation would only be carried out in immediate proximity to the vessel.

The goals of the 1978 archaeological excavation program were fourfold. First, it was necessary to clear the remains so that the dimensions and structural characteristics of the vessel could be analyzed and recorded. From what had already been exposed, it was clear that it would be of primary importance to plot the inclination of the keel and other structural elements with respect to the horizontal plane and with respect to each other to determine displacements which had resulted from disturbance to the ship, as well as the degree of rotation of the keel from the vertical and its bearing. This and other data would be crucial in drawing projections and views of the ship once excavation had been completed and also in relating the portion observed to other sections exposed at any later date. (Raymond Aker's letter, included in Appendix A, describes the intricacies of compiling the final drawings.) Second, the excavation program sought to assess the integrity of the vessel remains apart from the damage suffered in construction and to note any evidence of previous impacts. Third, the program was crafted to determine the relationships between the ship, the surrounding landfill, and the original bay bottom in the hope of gleaning insight into when and how the vessel came to rest within the confines of the Pacific Main Dock Basin. Finally, the excavation attempted to ascertain whether any structures or other artifactual features were associated with the remains of the ship.

Archaeological field work began on Thursday, June 15, 1978, and the first step of the process entailed the removal of all of the soil from within the hull of the ship. This was accomplished by placing a backhoe inside the sewer trench to the west of the ship, which scooped out dirt from inside the hull and dumped it into a large box on the south side of the vessel. This was then removed from the excavation by means of a hydraulic crane and trucked away.

During the initial day of excavation, the configuration of the remains slowly became apparent. The vessel lay on a north-south axis crossing the sewer excavation at an angle (see Map 4.08 below and Figure 4.11). As excavation around the remains proceeded, it became clear that the east side of the remains were nearly vertical, while a broad, nearly flat surface covered the bottom of the excavation to the west. At the point at which the two surfaces met, excavation exposed a single, large longitudinal timber. Still half-buried, obscured by tons of mud, the remains at this point seemed to suggest two possibilities. One was that the remnants were those of a flat-bottomed scow or barge: the upright remains were part of one side, the flat surface the bottom, and the fore-and-aft timber a chine log. Location of a companion chine log at the western edge of the "bottom" would confirm this interpretation. The other possibility was that the remains were those of a large, round-bottomed sailing vessel heeling over to the west as she lay on the bay floor. In this case, the flat "bottom" was in actuality one side of the hull, while the timber would be the keelson.

By the middle of the second day of clearing, it became evident that the second of these alternatives was the correct one. Clearing the south wall of the sewer trench, and removing the lowermost boards of the wooden lagging which had been installed, revealed plainly the curvature of the hull where the vertical topsides met the sloping floors of the bottom. The structure exposed lay in the unexcavated ground just to south of the trench and suggested that the upper parts of the hull were still extant where the trench had not cut through (Figure 4.12).

Once the inside of the vessel had been completely exposed, and arbitrary datum point was established from which all future measurements would be taken. The intersection of the center line of the keelson with the center line of the C-2 alignment as selected as an appropriate point of reference. Similarly, City Base (defined by the city engineer's office as 6.70 feet above the mean high water mark) was selected as the datum plane for all elevations.

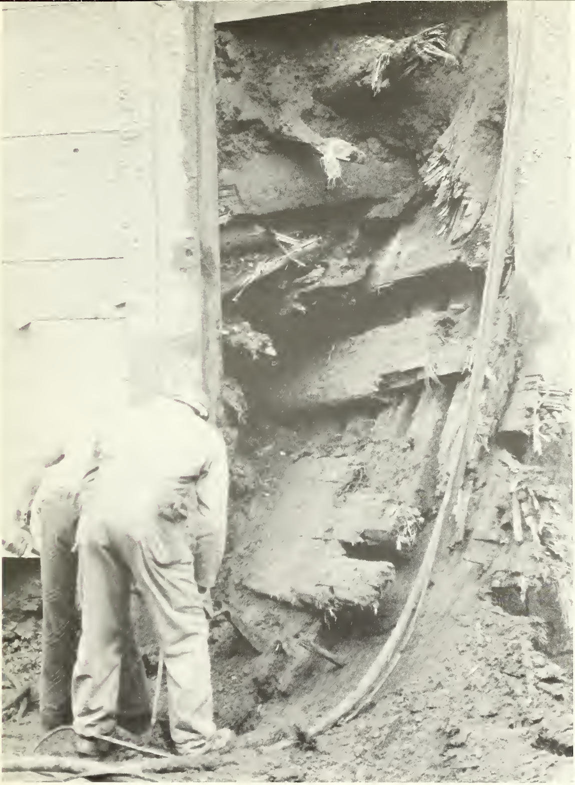
After clearing the interior of the hull, evidence was found to suggest that the ship had met its end through fires. Near the south wall of the trench, the uppermost portions of the hull appeared charred at a depth of about nine feet below datum. While it was impossible at the site to answer many of the questions raised about the accident that caused the ship's demise, the results of the preliminary excavation seemed to show that it was the fire that had led to the vessel's beaching at the King Street site. How much of the extant hull had been burned or cut down later remained unknown.

Following the clearing of the interior of the ship, work began on the outside of the vessel so that the keel and lower portion of the hull could be examined. Again, a backhoe was used to remove much of the soil from around the vessel, but all excavation of the keel was accomplished by hand.

As the surface of the ship's exterior began to emerge, one could observe that the lower part of the hull was covered with a layer of one-inch softwood sheathing (see Figures 4.14 and 4.15) which appeared virtually free of nicks, scratches, or abrasions. This suggested that the sheathing was new -- possibly part of a major overhaul and refitting just prior to her sinking. The sheathing would have been a preparatory step either to covering the hull with yellow metal sheathing or coating it with copper paint. Although no copper paint was detected on the hull, the weight of this evidence combined to suggest a late rather than an early date for the ship's abandonment within the Pacific Main Dock Basin.

A section of the one-inch wood planking covering the lower portion of the hull was removed so that the surface beneath could be examined. What was revealed was oak planking with evidence of numerous small nail holes, suggesting that the ship had been coppered and re-coppered several times during the course of what must have been a long life of active service at sea (see Figure 4.16). The only copper remaining was a narrow strip running along the botton of the keel.

A layer of tarry, fibrous material -- identifiable as what had been known as "Irish felt" -- was found underneath the wood sheathing. These bits of evidence confirmed other observations -- such as the wear visible



Figures 4.12 and 4.13: The True Remains Suggested. . .Below, Roger Olmsted inspects a knee at the lower deck level. Above, the location of that knee is found to be only about halfway up the part eventually exposed. (John Kortum)

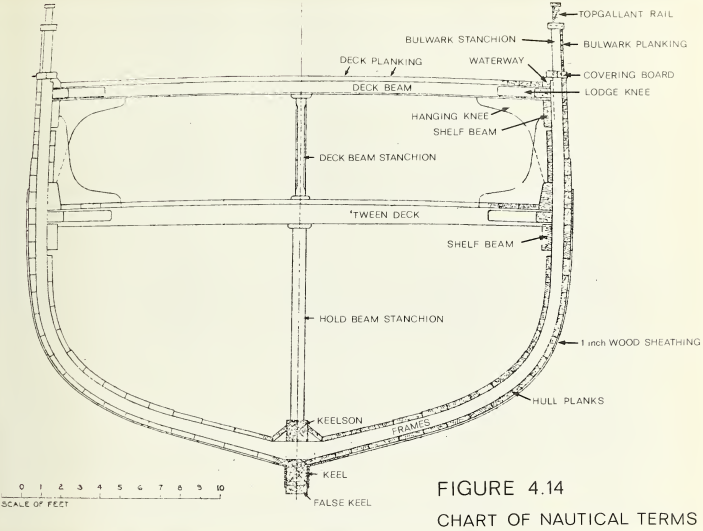


Figure 4.14: A Brief Glossary of Nautical Terminology. . . .This stylized drawing illustrates the terminology adopted in this report discussing the ship. (Janice Narita Pastron, based on Raymond Aker's section view of ship)

on the hull planks between the ribs -- which suggested strongly that the ship was already old at the time of her sinking (perhaps dating, in the opinion of maritime and historical consultants Aker, Olmsted and, later, Baker of the Massachuetts Institute of Technology, to the 1860s or before). Naturally, if through identifying the ship, this apparent age could be confirmed, the vessel might take on an even greater significance as a specimen of maritime architecture.

To the north of the vessel, part of a set of Douglas fir pilings were visible. Along King Street, prior to encountering the ship, excavation for the sewer trench had exposed and removed many more pilings running the length of the street from an undetermined point south of Second Street to the ship. Subsequent excavation of the remaining portion of King Street between the ship and the Embarcadero failed to reveal such pilings. It was not until after the archaeological field work of 1980 that a likely explanation of these pilings along the course of King Street emerged. Further discussion of this feature can be seen below in the section of this chapter discussing the 1980 archaeological excavation program.

Summing Up

Due to the damage and displacement suffered by portions of the hull from the original fire, subsequent impacts, or sewer construction, it was clear that a reconstruction of the section viewed during June 1978 would have to be compiled later, based on diverse measurements and observations recorded in situ. Given the fact that the deck was not seen, and that some parts of the hull had been destroyed, it was not possible to directly measure key hull dimensions, such as beam or depth. Nonetheless, judicious use of measurements showing size and joining of futtocks, curvature of the hull, and other indirect evidence made it possible to compile an approximation which would probably be accurate to within a foot or less. Recording of elevations and locations of vessel parts was carried out using a transit and stadia rod, after establishment of control points. These numbered control points, appearing in Map 4.08, were later used to relate the data acquired in 1978 to data from the 1980 excavation. In addition to recording the location of the vessel with respect to the sewer alignment, detailed measurement were made of visible ship structures and individual parts. These included the detail work surrounding the keelson, dimensions of keel, keelson, exposed futtocks, lodge knees, and curve of the exposed section of hull. These data are recorded in the form of partial section views, perspective drawings (Figures 4.18, 4.20, and 4.22), and photographs.

As an adjunct to these recording procedures, a photogrammetric survey of the ship remains was attempted for the purpose of achieving an accurate three-dimensional representation of the remains as they appeared in situ. With only a weekend remaining for excavation, it was impossible to assemble the full range of necessary equipment, however, with the result that the photogrammetric recording obtained was poor, though of some important use for later reconstruction purposes.

On Monday, June 19, construction in the segment of the C-2 alignment blocked by the ship was scheduled to recommence, with the mid-section of the vessel being cut through and destroyed. While severe damage had already been inflicted and while complete preservation of the remaining portions of the vessel in situ was impossible, removal of a relatively intact section of what remained was deemed feasible. Accordingly, it was decided that a cross-section of the hull, cut from near the south wall of the trench, would be extracted by sawing through the remains in two places, then lifting out the section thus freed with a large crane. This removed cross-section of hull would provide an intact specimen which could later be throughly inspected and analyzed for details of construction. In the future it was hoped the section -- a mate to that removed only weeks earlier from the **Niantic** -- could become part of a maritime museum display.

Removal of the section required a full day's time and work on a scale not commonly faced by archaeologists (see Figures 4.23 and 4.24). The section of the vessel ultimately removed from the trench by a half-dozen construction workers and several cranes was taken by truck to Fort Mason in the Golden Gate National Recreation Area. It was stored there, together with a number of lodge knees, hanging knees, beams, and other miscellaneous ship parts salvaged from the hulk during excavations.

On Wednesday, June 21, contruction resumed at its normal pace, and within days reinforced concrete replaced timbers at the bottom of the

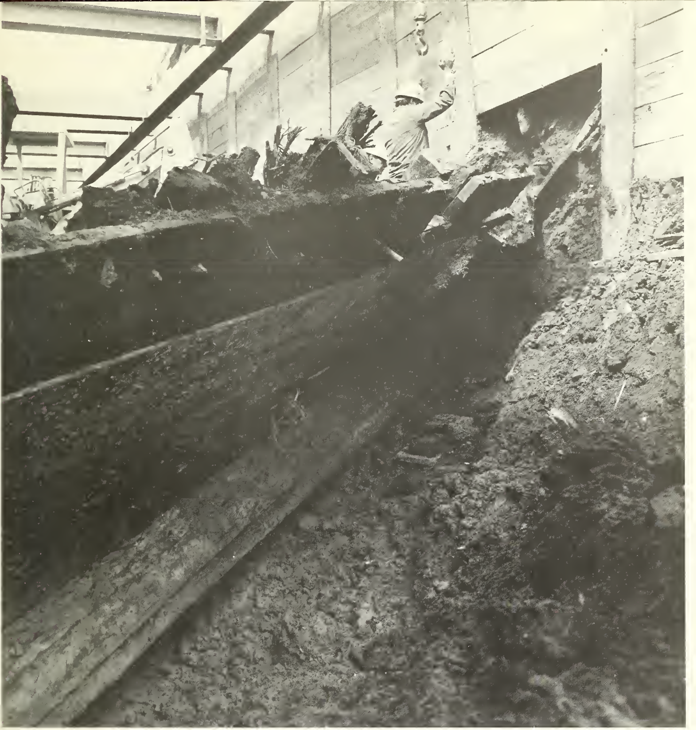


Figure 4.15: The Bottom of the Ship. . . The keel is seen extending across the photograph from the lower left after sufficient mud was removed. In this view the 1-inch sheathing of the hull is seen clearly. (John Kortum)

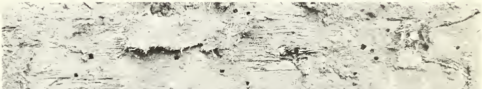


Figure 4.16: The Sheathing Removed. . . When the one-inch painted sheathing was stripped from the hull, the underlying three-inch-thick hull planks revealed hundreds of square nail holes, indicating that the vessel had been coppered many times prior to being sheathed. Traces of copper sheathing were present along the keel. The shredded material at top of photo is oakum, a sealant used beneath coppering or sheathing. (Jack Prichett)

trench in King Street. The archaeological/historical team had it data, and the question of what ship this was and what to do next in the search for the vessel's identity still remained to be answered.

Recovering Important Data

After the decision on Friday, June 16, to remove the largest possible intact section of the hull as a mitigation measure, the responsibilities of the historical consultant were two-fold. The first was to complete the cleanup of the sticky bay mud in and so far as possible around the outside of the vessel. (Constant pumping kept the water level low enough to clean out under one side of the ship to the bottom of the keel). The important second task was to take measurements and notes before the inevitable damage to the stucture occurred when the section was removed.

Ray Aker, president of the Drake's Navigator's Guild and an authority on old ship construction (and reconstruction through drawings), was a key member of this field operation. In addition, Larry Hitchcock, a skilled boat-builder specializing in the restoration of antique small craft who was on the site almost continuously because his shop was located across the street on Pier 42, took measurements and sketched the site after work in the late night of June evenings. While this direct measuring and sketching provided the basis for Aker's initial reconstruction drawing of the probable mid-section of the vessel (see Figure 4.17), mechanical surveys became another part of the recording process. A surveyor located the key points on the hull relative to City Base and surface reference points. Towill, Inc., a leading West Coast surveying and mapping firm, conducted a photogrammetric survey. Thus, all of the structure visible from above was permanently recorded by stereo-photography.

The direct measuring work by Aker and Hitchcock, it must be noted, should not be thought of as only supplementary to such advanced techniques as photogrammetric surveys. Measurements and sketches made by individuals familiar with marine construction records features that either the camera cannot see or later viewers might completely misinterpret. For instance, structural members such as knees that may have been knocked out of place can sometimes be reconstructed only by associations observable at the time and by details like the texture of a place where something might have been attached.

Finally, high quality photographs taken from any perspective that the photographer or historian feels may be revealing are another documentary tool that is sometimes underrated. Photographs by a skilled photographer offer clear and vivid impressions that may be absent from photographs designed only to record features. Indeed, the black and white images below made by John Kortum were particulary useful in describing the structure of the ship in King Street.

Removing a Section of the Ship

Removal of the largest possible intact section of the vessel was scheduled for Monday, June 19, but the operation took the better part of two days. Harlan Soeten of the National Maritime Museum served as chief advisor on rigging for removal and transport. In past years, Soeten has been called upon to manage the moving of many large and exotic maritime structures of questionable internal structural strength. The removal of the major section, a small sub-section, and salvage materials to storage at Fort Mason proved successful from the standpoint of inflicting minimal damage to remains that were of first importance as objects for study and analysis.

By mid-Monday, it was already apparent that the section coming out of the mud was a very poor specimen of what might be recovered with more detailed excavation beyond the boundaries of the sewer trench. When the historical investigator discussed with the contractor the care that should be taken in attempting to ease out the upper timbers at the southwestern "corner" of the section in the sewer excavation, the shoring impinging on these frames was forthwith knocked out, giving a freer view of the remains closer to the surface. Figures 4.12 and 4.13 show the situation before and after the removal of the lagging in this critical area. With a little excavation with a trowel, one could reach to what appeared to be the upper clamp. In other words, toward the presumed stern of the vessel, a few feet south of the sewer excavation, the vessel would be more or less intact to the deck level.

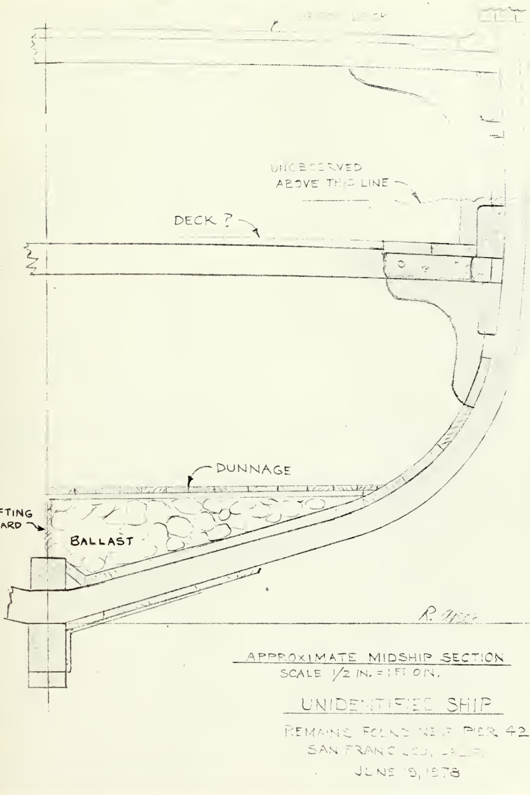


Figure 4.17: Preliminary Sketch of Vessel Reconstruction. . . At the conclusion of the June 1978 efforts, Raymond Aker's rough drawing projected a reconstruction of the ship which was shown two years later to be approximately correct.

Furthermore, it appeared that the deck level might be no more than five or six feet beneath the ground surface south of the sewer box. Some evidence of charring occurred at the uppermost level that could be reached by hand behind the shoring. A split and lightly charred section of a spar could be seen, but it could not be removed. Presumably, this spar was lying at the level of the deck beams.

A logical assumption followed that the vessel probably had burned to the high water line. As the keel sloped down the east ("south" from the line of King Street, using the convention of orienting to South of Market streets), the part of the ship lying below King Street beyond the sewer box would be burned down to a point not much higher than the upper levels visible on the north side of the sewer, while the more and more intact hull would appear beyond the sewer to the south. At this point the investigators agreed to call the end of the north side facing the original beach of the Pacific Mail Basin, the "bow", and the end in what was the deeper water to the south (east by compass direction), the "stern". There was no obvious physical evidence from what could be seen of the hull itself at the time that such was the case, but it seemed probable that the ship had been drawn up bow toward the beach.

As it daily became more apparent that the contractor's giant backhoes had engaged in a spirted, rather than a tentative, encounter with the ship, it seemed increasingly inappropriate to perform extremely costly and painstaking procedures to deal with the shattered part of a more intact adjacent hull. At the same time, the section was all that was available at the moment, and it was assumed that it would prove extremely valuable in identification and reconstruction -- as it has. For one thing, the albeit damaged section included a piece of the bottom of the vessel, vastly the most expensive and difficult portion to investigate in any later exploratory excavation.

Notes on Construction

The construction of the vessel, as it was revealed during the cleanup process of the excavation and in the subsequent removal of a cross-section of the remains of the hull, is perhaps most clearly described in connection with the drawings and photographs made at the time. This also has the virtue of keeping discussion of the structure within the limitation of what was observable then in the sewer trench. Later examination of the removed section has revealed points of interest, some of them important for developing the reconstruction of the ship by Ray Aker, as have been the observations made during the test excavation of March, 1980. But our certain knowledge of the nature of the vessel parts below the waterline is confined largely to what could be seen, our could have been seen, in the sewer trench in June of 1978.

The Portion Remaining: Figure 4.01 is taken looking directly along the top of the backbone of the ship as it disappears into the south wall of the sewer excavation. We are looking along the top of the keelson as it slopes downward to what we assumed (correctly, as the 1980 excavation proved) to be the stern of the vessel. At the left is a small remaining part of the bottom of the starboard side of the ship. The vessel lies heeled down on her port bilge; if she were bolt upright, the frames and ceiling at the left would rise at an angle of only 15 degrees.

The top of the keelson was in this chewed-up condition when first observed by the historical investigator, as were the ceiling and frames. To identify at the outset some of the recurrent structural terms that are used throughout this chapter, the frames are the familiar "ribs" of a wooden vessel, forming the shape of the hull in section and running perpendicular to the planking, ceiling, keel, keelson, and other for-and-aft members. Each frame is pieced up from several lengths called futtocks.

At the center in Figure 4.01, several of the futtocks can be seen where the ceiling has been ripped away. The ceiling is laid and fastened much like the planking on the outside of the vessel, but is on the inside of the frames. Here, the broken ends of the ceiling planks can be seen extending up to the point where the bottom of the canted hull disappears behind the shoring of the sewer wall; part of the ceiling planking closest to the keelson is still entirely in place. At the center of the keelson, in the undamaged area about six feet from the camera, is a rectangular depression which is the mortise for the tenon of a vertical stanchion that supported one of the lower deck beams.

Figure 4.17 is Ray Aker's preliminary scaled section from his field sketches and measurements, and in it the relationship and dimensions of the parts seen in Figure 4.01 can perhaps be seen more clearly. This drawing shows the opposite (port) side of the ship at the south wall of the sewer. The ballast stones, with a double course of light decking or dunnage laid over them, were found at the south end of the keelson where it meets the wall of the sewer excavation in Figure 4.01.

An overall view of the hull in the sewer trench, Figure 4.11 places Figure 4.01 and the preliminary section (Figure 4.17) into the perspective of the hole in the ground. The workman at the right in Figure 4.11 is standing just this side of the keelson, the immediate right foreground of Figure 4.01. The tilted up (east) side of the bottom in the backgound extends only about five feet outward from the keel and keelson, a dozen frames or "ribs" (with the attached planing and ceiling) having been cut cleanly off. The hull extends much wider west (port side) of the keelson, and the beginning of the upward turn of the bottom can be seen in the foreground.

As the ship lay at an angle to the sewer trench, as overhead steel beams restricted the size of a potential lift, as the remains within the trench were already badly mangled and partially lost, and as the chances were poor that a section of the hull that included any diagonally-cut portion would hold together during lift and transport, it was decided to remove the longest possible section perpendicular to the keel. Because the widest intact section extended from the keelson to the portion of the vessel at the lower right in Figure 4.11, the section chosen to be removed was that to the right of the two workmen at the center of that photograph.

Some Parts Revealed

About half of the hull in the sewer was to be removed as an intact section and about half in pieces. It should again be repeated that it was abundantly clear that damage inflicted during the sewer excavation (prior to identification of the vessel as a historical cultural artifact worthy of expert observation and opinion) had greatly compounded damage inflicted long ago and that a much more intact portion of the vessel lay to the south, if not also to the north of the sewer trench. Therefore, in the face of lugubrious scenarios relative to the fantastic cost of any delays in sewer construction, it appeared unproductive of any reasonable end to attempt to salvage pieces with the intent of full restoration at some future date.

Rather, all timbers not part of the salvageable section were removed in a fashion consistent with revealing the construction as fully as time permitted and consistent with saving as much as possible for future study or possible use in as yet undetermined exhibition modes. All of the structure in the sewer excavation trench was salvaged and stored at the Golden Gate National Recreation Area.

Figure 4.15 shows the keel and outside of the bottom on the east side of the excavation (starboard side of the vessel). The 1-inch wooden sheathing on the outside of the planking shows clearly in this view. This sheathing was free of damaged by marine borers and appeared to have been new at the time that the vessel was abandoned. The 5-inch inch keel shoe can be seen at the bottom of the 13 x 15-inch oak keel in this view; the bottom of the shoe is coppered. Figure 4.18, a field sketch, shows some planking and timber sizes. The ceiling observed in the bottom of the vessel is oak; the planking is oak up to the turn of the bilge, and yellow pine above. The planks are not of uniform width.

After the yellow pine keelson was cut away beyond the section to be salvaged, the spacing of floors and frame futtocks could be seen. Figure 4.19, taken just before Figure 4.11, shows one of the floor timbers (broken off near the workmen's leg) being hoisted out. In every second set of frames, the lower futtocks butted together at the centerline, between the keelson and keel. In between these a sawn or partially naturally crooked floor timber ran athwartships between keelson and keel, to butt against the lower futtocks of the next frame set. Thus, the butts between the futtocks making up each set were staggered with those of the next, the planking and ceiling serving to hold the shape. This is in contrast to later nineteenth century doubled frames, where the butts of the futtocks were staggered in the same manner, but the futtocks were also fastened together laterally. A long bronze drift bolt ran through keelson, floor, and keel at every fifth station. At the floor station in between, a smaller bronze drift fastened the floor to the keel only. Figure 4.20, another field sketch, shows the arrangement of floors and frames.

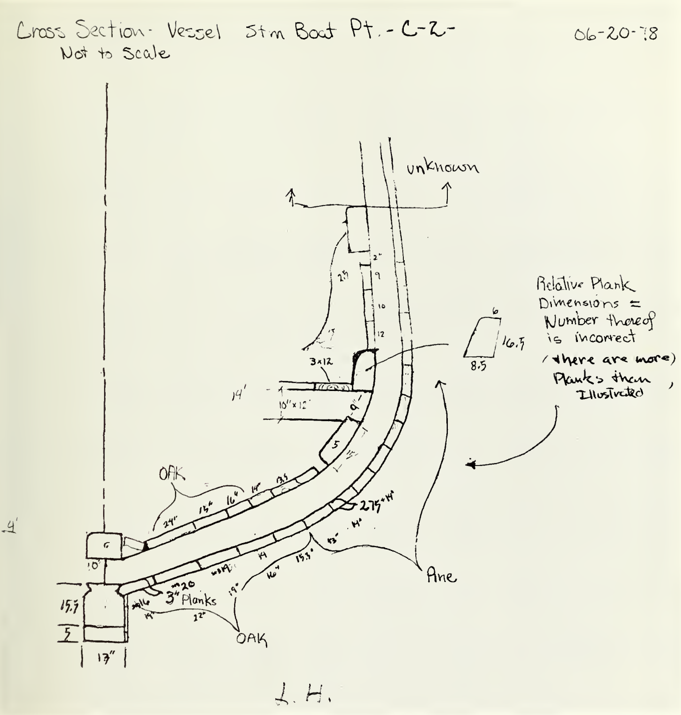


Figure 4.18: Field Sketch, Showing Hull Measurements. . . Working under difficult conditions, Larry Hitchcock recorded the size, number, and placement of structural elements in the exposed portions of the hull. Overall dimensions were impossible to obtain, since the upper portions of the hull had been destroyed or lay outside the walls of the sewer trench. The apparent presence of a 'tween decks suggested that the main deck, if still intact, lay within five or six feet of the ground surface.

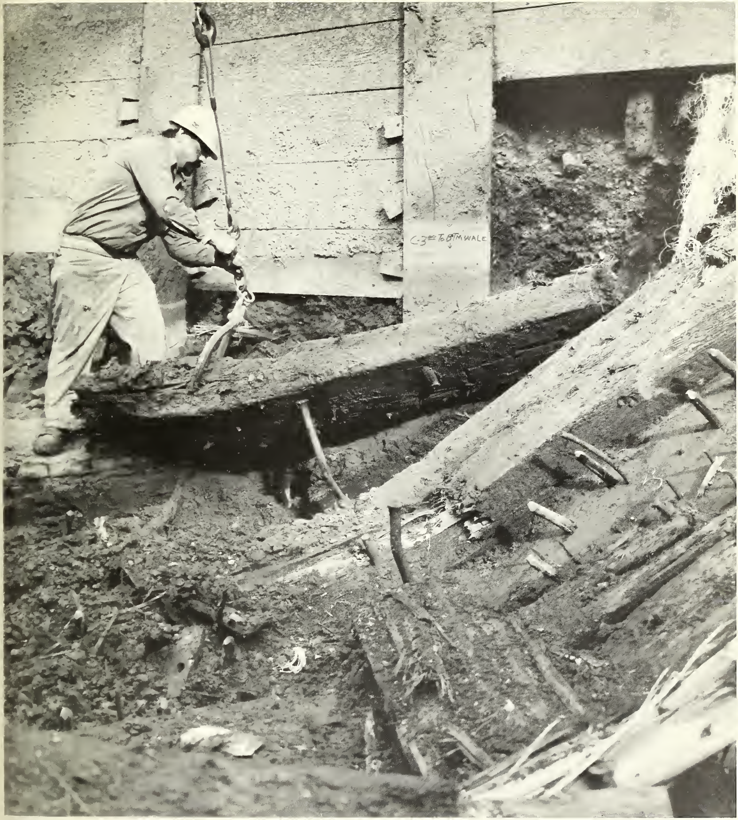
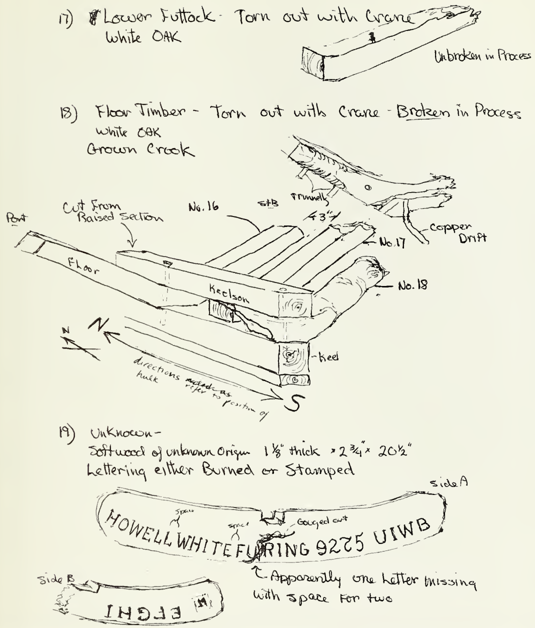


Figure 4.19: Removing a Floor Timber. . .Timber part of the hull that could not be salvaged as a cross-section was removed piecemeal. Here, a broken floor timber comes up and out. Two of the long drift bolts through the keelson, floors, and keel can be seen at the center. (John Kortum)



17) Lower Futtock - Torn out with Crane
White OAK

18) Floor Timber - Torn out with Crane - Broken in Process
White OAK
Grown Crook

19) Unknown -
Softwood of unknown Origin 1⅛" thick × 2¾" × 20½"
Lettering either Burned or Stamped

side A
Space
Space
Gouged out
HOWELL WHITE FURING 9275 UIWB
Apparently one letter missing with space for two
side B
EFGHI
M

Figure 4.20: Field Sketches of a Futtock and Part of the Keelson. . .were recorded on the spot by Larry Hitchcock. Schematized drawings such as this one are frequently more useful than field photographs for later analysis. Also shown is the puzzling Howell White "nameboard".

Figure 4.21 offers a fine view of the planking fastenings. The floors and futtocks across the width of this small portion of the bottom have been removed, and we see only the inside of the planking, with treenails and spikes projecting through. Acting as main fastenings, the treenails are oak dowels fashioned by hand; they were gotten out with a spoke-shave to hexagonal form, the "diameter" across the flat sides being the same as the diameter of the hole bored to receive them. Driven home, the corners of the hex shape were compressed for a very tight fit. These are an old style of treenail fastening from the standpoint of material, shape, the fact that they did not go all the way through planking, frames and ceiling, and the fact that they were punched and wedged at the exposed ends with pyramidal plugs. Perhaps one reason for not driving the treenails clear through, as in later West Coast-built vessels, was that the planking and ceiling had been made in random widths, and a through- treenail might hit on or close to a seam. The spikes are all yellow metal. It may be that metal fastenings above the waterline are iron, but not enough of the hull at this height was visible in the excavation to establish the point.

Figure 4.22 shows some of the construction at the highest level we could reach, up in the southwest corner (see Figures 4.12 and 4.13). This and other drawings here should be compared with Aker's 1980 reconstruction, based on further information including the test dig (see Figure 4.13). Figure 4.22 shows that the upper clamp, just beneath the upper deck beam, was momentarily reached. The note that the hull apparently extended 50 inches above the indentation for a standing knee in the lower deck waterway may have been about right at that place, but a few feet further south the hull was found intact to 6 feet to the covering board and rail stanchions. The extimate of the upper clamp being 6 feet below ground was close indeed, as the test excavation of 1980 showed.

The removed section as it first appeared is seen in Figures 4.23 and 4.24. In Figure 4.24 we see the keelson and keel cut through at a place where the futtocks butt together at the centerline. The extraordinarily wide ceiling strake nearest the keelson--a 24-inch oak plank--shows clearly. This particularly wide plank in this location might have been introduced to enhance the overall strength of the fastening system between the floor sets and butted frame sets in the way of the keelson and keel. A much larger and wider built-up keelson would have served this same purpose, but note in this photograph how much smaller the keelson is than the keel.

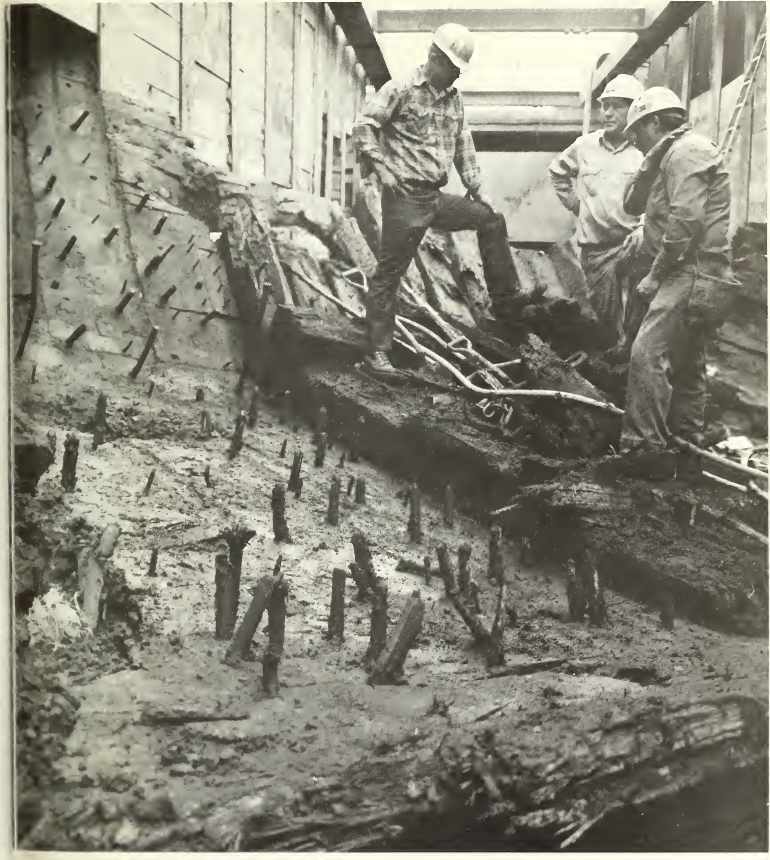


Figure 4.21: The Fastenings Revealed. . .With the ceiling stripped away from the section that could not be salvaged and the floors and futtocks removed, the treenails and spikes fastening the planking could be seen from the "inside out". Photogrammetry, necessarily accomplished before this partial removal of timbers, could not show such detail. Hence, the need for a good on-site still photographer at all stages of the work. (John Kortum)

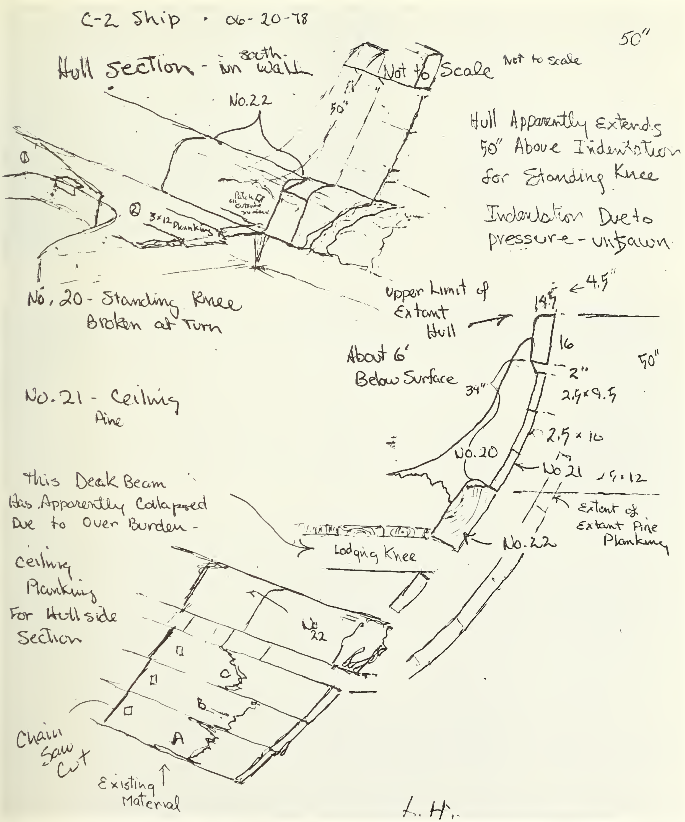
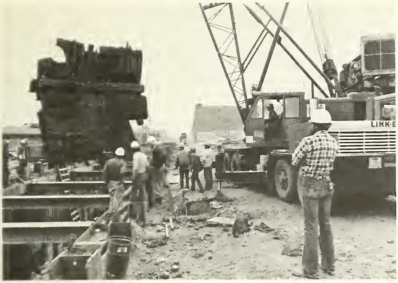
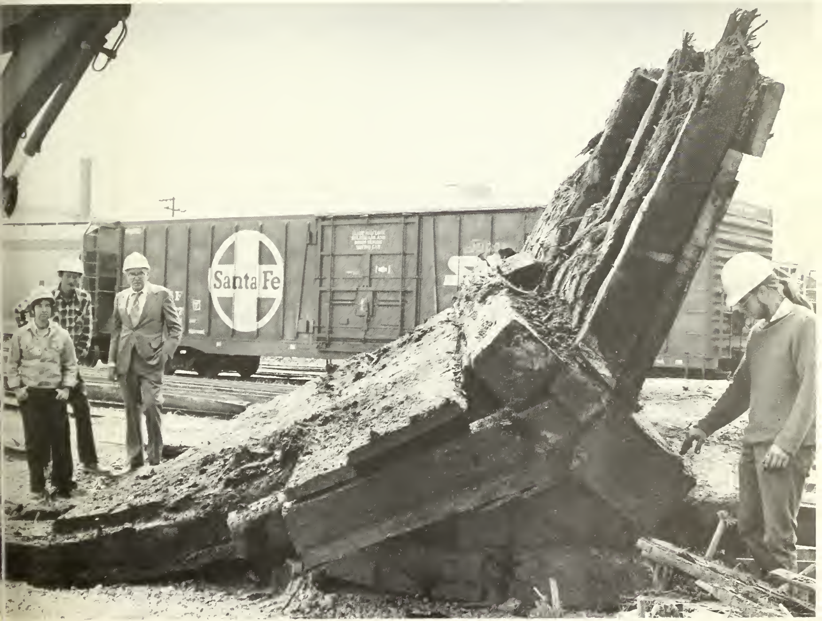

C-2 Ship · 06-20-78
50"
Hull Section - in south wall
Not to Scale
Not to scale
No.22
50"
Hull Apparently Extends 50" Above Indentation for Standing Knee
Indentation Due to pressure - unsawn
①
②
Patch of on outside surface
3×12 Planking
No, 20 - Standing Knee Broken at Turn
Upper Limit of Extant Hull
14.5
← 4.5"
16
50"
About 6' Below Surface
34"
2"
2.5×9.5
No. 21 - Ceiling Pine
2.5 × 10
No.20
No 21
2.5×12
This Deck Beam Has Apparently Collapsed Due to Over Burden -
Extent of Extant Pine Planking
Lodging Knee
No.22
Ceiling Planking For Hullside Section
No 22
C
B
A
Chain Saw Cut
Existing Material
L. H.

Figure 4.22: Field Drawings, Showing Hull Section and Deck Beam. . . Though displaced, enough structural parts were visible in the south wall of the sewer trench to enable field reconstruction of details of the hull. (Larry Hitchcock)



Figures 4.23 and 4.24: Raising the Cross Section. . .The view below shows some members of the salvage team: (from the left) Allen Pastron, Archaeologist, Roger Olmsted, Maritime Historian, Harlan Soeten, Curator, National Maritime Museum at San Francisco, and Larry Hitchcock, Jack of All Maritime Trades, who assisted Raymond Aker and Roger Olmsted in measurements and supervision. (John Kortum)



When the section of the vessel encountered by the King Street excavation had been removed to a covered storage area at Fort Mason --and the pressure of hourly decisions and on-the-spot observations also removed-- several immediate and obvious goals for research were apparent.

(1) On hand were a large cross-section of the vessel from somewhere in the central portion of the hull, together with a large quantity of disassembled structural parts that could not be removed intact with the section. Examination of this material promised to provide important clues as to the type, origin, age, and perhaps even the last use of the vessel and the circumstances of her loss or abandonment.

(2) Scanty associated artifacts included a Hong Kong ginger beer bottle of English manufacture and a curved board with names, numbers, and letter groups inscribed (see **TWO ARTIFACTS SUGGEST A TRAIL** below). Perhaps these would aid in identifying the vessel.

(3) Given the possibility that the vessel had been burnt to some degree and abandoned immediately before the completion of the seawall at the foot of King Street, that is, in the first decade of this century, direct or anecdotal recollection might prove a quick short cut to identification. Captain Fred K. Klebingat, a proven first-hand authority on the San Francisco waterfront and maritime vessels, promised to be the best oral informant.

(4) Archival research could almost certainly turn up a specific identity to the vessel **sometime**. But it could very easily consume weeks or months with **no** "big payoff", too.

An important element extraneous to the ship identification program itself but affecting research on the ship was the pressure other concurrent investigating programs on the historical and archaeological investigators. The major underground portion of the ship was in no danger of further impact by new construction. At the same time, a very intensive crash program of investigation (and possibly protection) of historical cultural resources at the Wastewater Management Program's Southeast Treatment Plant expansion site developed early in September. Movement on the ship identification program was therefore geared to a comparatively slow pace based on the historian's years of experience in the belief that modest ongoing investgations and analysis in one direction or another might well add to a sudden research breakthrough in a perhaps unexpected direction.

Wood Identification

Positive identification of the varieties of wood used in the several parts of the hull clarified that the vessel was constructed on the East Coast, as preliminary examination of samples had suggested. The Forest Products Laboratories at Madison, Wisconsin, was not able to identify all samples with the precision that we might have hoped for, however. For instance, the sample of upper-hull planking identified as "(Pinus) of the yellow pine group -- probably southern" does not have the ring of certainty that an old ship builder might offer: "Long leaf yellow pine; used it all the time for keelsons, clamps, ceiling, and planking." But all together, the materials as identified were typical of those used in good ship construction in New England and the Middle Atlantic states in the mid-nineteenth century.

The historical investigator's letter to the Forest Products Laboratories of July 10, 1978, excerpts of which are included below, clarifies the state of knowledge about the vessel at the time of the removal of the section. (Note: to these excerpts are added the Forest Products Laboratory's subsequent identification of the types of wood of which the structural parts were made.)

> *The hull of the vessel is of a construction style quite different from that employed on the West Coast in the last half of the nineteenth century — and the woods are obviously not those commonly used out here. The vessel is mostly constructed of hardwood, tentatively red oak, below the waterline, and some kind of pine above, suggesting an East Coast origin. But local opinion as to the identification of the wood has run so far as to suggest even Australian construction.*
>
> *Certainty as to the types of wood in the construction members may fit together with historic construction methods in different localities to reveal something of the identity of this vessel. At present, examination of construction technique has not precluded the possibility that the hull dates from 1850 or earlier. Alternatively, "old styles" of construction were used much later in some places. . . .*

At this stage the regional maritime experts (including this writer) have no idea as to the provenance of the ship we have on our hands. She was perhaps a brig, brigantine, or schooner, of 150-250 tons, probably around 100 feet long. The beam was 26 feet. Enclosed is a preliminary reconstruction drawing and samples of wood. . . .

Below is a list of the sample parts of the vessel (and the Laboratory's later identification):

(1) Bottom ceiling -- (Quercus) white oak
(2) Bottom planking -- white oak
(3) Upper Hull planking -- (Pinus) of the yellow pine group -- probably southern
(4) Hull sheathing -- spruce
(5) Lower clamp -- yellow pine
(6) Upper ceiling -- yellow pine
(7) Keelson -- yellow pine
(8) Keel -- white oak
(9) Spar -- (Pinus strobus) white pine -- probably eastern white
(10) Lower futtock -- (Quercus) red oak
(11) Frame -- (Acer) maple
(12) Upper futtock -- yellow pine
(13) Trunnel -- white oak
(14) Standing knee -- spruce

How Old is She?

As the letter to Forest Products Laboratory indicated, from the outset it appeared that the vessel might date earlier than 1850. Deep grooves worn in the planking of the bottom between the frames suggested many (30?, 40?) years of slow wearing away of the grain by the action of bilge water carrying particles of grit. Thus, assuming that the vessel was abandoned shortly after 1900, a construction date no later than the end of the 1860s seemed extremely probable.

Particular characteristics of construction that appeared to place the vessel much earlier also had to be considered. Lying next to a similar section of the almost simultaneously recovered **Niantic** (built in 1835), the King Street vessel was directly compared to her neighbor, and some of her construction features appeared more antique (see Figure 4.14).

(1) The treenail fastenings--long dowels passing through planking, frames, and ceiling--were unlike those of the **Niantic**. The **Niantic**'s treenails, though also shaped by a drawknife rather than turned out on a lathe like late nineteenth century treenails, were vertically wedged at the

ends. The wedge in the treenail served the same purpose as the wedge in the handle of a hammer or similar tool, and the treenail, once driven through a tightly bored hole and wedged at the ends, made the strongest and tightest type of fastening for wooden ships. The King Street Ship's treenails, however, were deeply punched at the center and expanded by driving home a pyramidal wedge.

Furthermore, only one end was punched and plugged; the other did not pass clean through the hull, but was bluntly pointed at the inner end. This type of fastening was not merely an alternative style to that of the **Niantic** or of familiar West Coast-built vessels--it was an older style.

(2) Seen next to the **Niantic,** the keelson of the King Street Ship seemed puny, being a single timber, smaller than the keel, rather than the massy, built-up member seen in later ships, made up of sisters and riders all scarfed and fastened together. On the other hand, the lower ceiling was oak, of impressive dimensions.

(3) The single, rather than double, frames that had at first sight in the mud suggested a barge-type of construction derived from a very old framing technique of the sort found, for example, in medieval ships. The **Niantic's** frames were not absolutely doubled, with the futtocks touching, but were placed so closely that little spacers were inserted where horizontal treenails had been driven between the futtocks to assist in setting up the frames. Thus, it was impossible to assume with complete confidence any close estimate as to the age of the ship.

Hypotheses and Scenarios: Dates of Building and Loss

While it appeared that the remains observed could fit a wide range of building dates, two general hypotheses seemed to fit the case:

(1) The vessel was built on the East Coast (probably in New England) before about 1850--perhaps as early as the 1820s or '30s.

(2) The ship was built in the 1850s or '60s on the East Coast by a small builder of the not uncommon type who ran what we might call today a "backyard operation". Sound but "old fashioned" techniques and practices were followed, and the result was a ship that lagged in technology and fashion.

In summary, the ship could have been a typical product of her class and time, or a partial sport or throwback built in later decades. Keep in mind that the evidence of wear made it appear extremely unlikely that the vessel could have been built later than the latter part of the 1860s.

Again, two hypotheses appeared most plausible regarding the date of her loss:

(1) The vessel was involved in some circumstance or mishap that resulted in her beaching in the Pacific Mail Basin. This occurred during the period of dramatic alteration of the configuration of this section of the waterfront resulting from the construction of the new seawall sections just to the east (1903-1906) and the destruction of the old Pacific Mail Dock and the filling of the waterlots in the former basin.

(2) Less likely, but conceivable, was the chance that the vessel sank in the basin earlier, most likely during the first period of great change (1867-1873) when the Mail Dock was built, Tichenor's Ways abandoned, and the big Central Pacific car ferry slips built.

As will be seen in the sections that follow, a modestly-paced identification program approached the problem by way of dealing first with leads that might develop maximum information at minimum cost and investigate those possibilities that involved the less formidable commitments in research time and money.

A VETERAN OF THE CITY FRONT CONSIDERS THE EVIDENCE--LETTERS AND INTERVIEWS WITH CAPTAIN KLEBINGAT

One possible means to quickly identify the actual name of the ship--a possibility that perhaps colored the manner in which investigation of its identity should be pursued--was particularly active in the mind of the Principal Historical Investigator. As early as 1951, Roger Olmsted, as curator of the San Francisco Maritime Museum, had interviewed waterfront veterans whose active careers as seamen intimately familiar with San Francisco waterfront activity dated to well before 1900. "Old Tom" Crowley, for example, had talked about how he began the career that led to the present world-wide tugboat operation by running launches that visited every nook and cranny of the active San Francisco-Oakland waterfronts. H. J. Tietjens, whose small tow boats operated in and around Channel Street and the waterfront, was similarly interviewed in a little office near the Third Street drawbridge. Skippers of the numerous scow schooners that landed at the nearby Hay Wharf, and captains, mates, and seamen of the lumber schooners and steam schooners that were in and out of port every few weeks or months had been interviewed in the late 1950s.

It was frustrating to realize that had the King Street Ship been discovered 25 years ago, her name, and perhaps numerous details concerning her activities, her owners, her masters, and her end, would have been obtained by asking around. But in 1978, there was almost no one left to ask. An exception was Captain Fred K. Klebingat, whose recollections of the waterfront and maritime activity of the early years of this century are spectacularly enhanced by the intense curiosity and taste for observation that he exhibited even as a boy of 16, freshly arrived in San Francisco as a seaman in a Cape Horn square-rigger.

But Klebingat hit the city front in May of 1909, shortly **after** the last possible date that the vessel might have been buried behind the seawall. Still, it seemed possible he might hae heard of the demise of the vessel, had there been some circumstances of early waterfront anecdotal value connected with it. In any event, Klebingat had the most extensive first-hand knowledge of which we were aware of the activities of all types of sailing vessels that visited the San Francisco waterfront, from the South Sea traders to the salmon packets that voyaged to the Bering Sea. Klebingat had worked his way to master when commercial sailing was already on the decline, and had stuck to sailing vessels through the last days of the species.

In recent decades, Klebingat, in correspondence with Karl Kortum, director of the National Maritime Museum, has advanced his recollections into marine scholarship, including such matters pertinent to this case as the details of the field construction of sailing ships. We therefore looked for the opportunity of getting first-hand Klebingat observations of the section of the ship now resting in the Fort Mason shed in the custody of the National Park Service. Since his retirement to Coos Bay, Oregon, Captain Klebingat made occasional visits to San Francisco that were always something of a celebration of astonishment for everyone who came within earshot of his familiar, "Well, now I'll tell you--it was like this . . . ."

During July and August of 1978, we brought him up to date with information regarding the wood samples, the details of construction drawings, a reconstruction of the ship, and maps showing the construction dates of the seawall and the position of the vessel. Captain Klebingat's first theory was that there was a strong possible association with the South Seas copra trade. (Copra is dried coconut meat from which coconut oil is extracted.) The following pages include excerpts from a letter to the authors dated August 8, 1978, some notes by the authors, and a later interview with Captain Klebingat on the copra connection.

> *You know that I arrived at San Francisco about May 1909; I landed at Pope & Talbot's yard in the Fourmasted Schooner "Annie E. Smale". Pier 42 did exist then. I have described the building of the Seawall from Howard unto Pier 42, and have told everything that I saw those days. But this wreck was then already covered with fill or I would have seen it. I made many trips on foot past the Old Pacific Mail Buildings and have described them, I think in my "A Waif of the City Front". Those days I took notice of a building, a brick building, that surely had survived the San Francisco Fire that was at the foot of Second Street and it housed the Pacific Oil and Lead Works. Many a time we watched the presses extracting oil out of copra. And here may be the solution of the fire. This vessel may have been loaded with copra, the standing ballast resembles that generally loaded at Tahiti. River boulders jokingly referred to as "Fataua Yams", they came from the bed of the Fataua River close by to Papeete and the wharf. Yams in the South Sea are tubers, some of*

> *very large size weighing over ten pounds and resembling those river boulders. No sign of cargo, well, the copra not consumed by the fire would float off or decay. And I can assure you, that copra makes a very hot fire; it burns as intense as gasoline, when it has started. The vessel was moored near the Pacific Oil and Lead Works, and there was danger of other property going aflame so they moved the vessel and beached it on a flat. The fire brigade may have pumped too much water in her, there was danger of scuttling alongside the Pier.*
>
> *How did this vessel come to Tahiti? She may have come there with a cargo of coal. Or Crawfords Pacific Mail Ships, either "Tropic Bird", "Gallilee" or "City of Papeete" had a long passage home, and Crawford had to charter a vessel to be ready to sail on the first of the month, as the Mail Contract called for. That of course would put the date of the burning previous to 1900, when Crawford lost the Mail contract, Spreckles took over and put the original "Mariposa" on the run.*
>
> *Of course, you will know if the Oil Works was in existence at Second Street at that time.*
>
> *But of course mine is only a wild guess. I note that you have identified the ship now as eastern built. The very light ceiling and timbers were proof that she was not built on the Pacific Coast . . . .*

The Pacific Oil and Lead Works: Following Captain Klebingat's lead, we looked at the history of the Pacific Oil and Lead Works. The **Daily Evening Bulletin** described the works built in 1866: "The Building is a fine brick one, 125 by 100 feet, and to obtain space for it a hill which abutted on the bay has been cut away at considerable distance so it now with a precipitous face stands like an ancient ruin as a memento of old times in San Francisco" (**Bulletin,** July 9, 1870).

The four-story building was built over a basement (a novelty for San Francisco) which was used to store barrels of linseed oil. The oil was cooled in three large iron vats in the basement after it was refined on the first floor. Seed and meal were stored on the first and second floors. The seed was dried on the third floor and dropped into a large hopper on the second floor, where it was sifted onto three five-ton grinding stones (carved out of Angel Island) to be rolled and pounded into a cake with the oil extracted. Five tons of flax seed a day produced 400 gallons of oil. In 1870 the flax was imported from both China and Chile--supplemented with a small crop grown in the Delta and Southern California (Hittell, **Scraps:** v.1)

The one problem that the company's founders, L.B. and John Benchly, could not solve in the plant's earlier years was persuading California farmers that there was profit in raising flax. Various accounts indicate that the plant had to close down from time to time because of a shortage. The company ad in the 1868 **City Directory** had a line of bold type at the bottom that read, "Highest prices paid for flax seed delivered to the Company Works at King near Third" (Langley 1868). To augment the linseed oil production, the company produced some 60,000 gallons of castor oil in a year.

By 1887 the plant was in full operation and had added coconut oil as a side line. Copra was imported from the South Pacific, and the coconut oil brought 75 cents a gallon as a valuable commodity in the soap and cosmetic industry. As with linseed, the by-product left after the oil has been pressed is a cake that is ground up for cattle feed (Hittell 1882: 717).

An 1887 Sanborn Map shows the Pacific Oil and Lead Works extending for 275 feet along the north side of King Street with an addition to the rear that reached all the way through to Townsend Street (see Map 4.01). A look at Arnold's Map of the waterfront of 1877 shows the original Pacific Oil and Lead Works as it appeared in 1866, when it was founded. When Captain Klebingat was watching the oil being pressed out, the works looked much the same as on the 1887 Sanborn Map. A Sanborn update to 1905 in the San Francisco Water Department archives showed no significant changes.

By 1891, Pacific Oil and Lead no longer manufactured zinc and lead paints. By 1915, the company had added a small warehouse on the vacant site along King Street, and coconut oil was its main product. Compressors had taken the place of the big stone slabs used for pressing linseed oil. The former site of the pioneer Pacific Oil and Lead Works is currently occupied by a two-story, reinforced concrete warehouse.

One question to be answered about the site described by Captain Klebingat is how far was the Pacific Oil and Lead Works from the Pacific Mail Dock Basin? Certainly the railroad tracks seen in the 1887 Sanborn Map led directly to the basin area. From the shore near the foot of Second Street to the works was about 740 feet--less than a block.

The Copra Connection: Speaking of the possibility of the vessel having been in the South Seas copra trade, Captain Klebingat discussed the handling of such a cargo--a point of importance relative to the possibility of fire and potential evidence that the vessel indeed had last carried such a cargo.

> *Well, you see, at first they didn't make copra--they made coconut oil in wooden troughs. The natives grated the coconut and put it in troughs, old canoes and stuff, and let the sun beat on it. The coconut oil would ooze out, you see—but it was a very crude method of doing it. The natives used it for cosmetic purposes, like you use skin lotion. Samoans, especially are crazy about it—I mean even to the day I was there. If you had a bottle of coconut oil, by God it wasn't safe. You looked away, and they would have got hold of it and rubbed themselves all over with it.*
>
> *But the method being so crude, then came the idea of producing copra. They dug the meat out of the coconut and put it in the sun to air dry it, and when it's properly dry, it cracks, like a piece of cracker, you see. Of course you have got to protect it from the rain . . . and bugs get in it. On Fanning Island they had a big shed, and it was run in and out on rollers. It was done on a big scale; you see, the natives, doing it on a small scale, would take it into their house . . . San Francisco was involved in all of that, too. The firm of Whitemen, Crane & Stewart are still in business in that, and Samoa especially. Of course, in (Robert Louis) Stevenson's time, it was Whiteman Brothers.*
>
> *I was giving it quite a bit of thought during the night. That vessel you have found, the way she is, she was absolutely unfit to carry lumber. So I figure this way: Whiteman had a small bark—I forget the name right now—about that size. You mention that she had been coppered at one time. All South Seas schooners were metalled like that. And the reason is this: there were no drydocks, but the natives could put on metal underneath the water. I have done it on the* ***Fisherman.***
>
> *So one theory: That vessel burned alongside a wharf, and became a total constructive loss. But, she had been metalled shortly before then; and to salvage that metal, which was valuable, they went to work and took the metal off the ship. But they couldn't remove the shoe, and that's there. It was sitting on the blocks (on the drydock or railway). Then they took her off and beached her where you found her.*
>
> *On the copra, now, they loaded it in bulk, shoveled it in. Afterwards you took it out with suction hoses.*
>
> *Your vessel carried this standing ballast. The copra is very light. In the* ***Melrose*** *they carried about 40 tons of stone—Tahiti, these "Fataua Yams" I called them.*
>
> *The Pacific Oil and Lead Company didn't own these copra schooners—they just bought the copra. To the South*

> *Seas they carried just general cargo; anything you would use in a house. And especially in those days here we loaded hardtack—you know, biscuits—and flour, and canned beef, and salt salmon and canned salmon and anything you wanted—knives, axes and even on deck maybe a couple of big logs, schooner masts. We even carried a windlass for a ship and steering gear for a ship; we even carried an engine down there. When I was in the South Sea trade, the era of engines—power schooners—was just coming in. I still saw all the great mass of schooners there. But that was done away with. When you got one engine in a schooner, they would do away with two or three schooners. Those engines, the Frisco Standard, the Union was a favorite, and the Atlas—I've been writing about that. Somehow, I'm interested in engines, too.*
>
> *Unloading the copra in those days, we sacked it. I used to drive the donkey, and we contracted with the longshoremen for so much a ton to sack it up. In the South Sea they brought it on board in sacks, and then you emptied the sacks—throw it in the hatch, or down below you dump it with a sweeping motion. You left the sack in the South Seas because they were valuable. The only time we kept the sacks was when you wanted to build a bulkhead or something like that, where we couldn't get away any other way.*

New Sheathing on an Old Hull

One striking characteristic of the condition and structure of the lower portion of the hull encountered in the excavation was the one-inch wooden sheathing covering the bottom of the vessel. Such sheathing, laid over Irish felt and set in tar, was the usual surface preparation for the final application of sheets of copper and copper alloy. This yellow metal surface, applied to a point above the load waterline, poisoned marine life including barnacles and weeds that would otherwise attach themselves to the bottom, in a few months time turning the smooth underbody into an upsidedown marine garden that at first would merely slow the rate of sailing, but finally even make ship handling difficult.

Figure 4.25 shows the old whaler **Sunbeam** hove down, probably at New Bedford, with sheathing and coppering of one side of the bottom underway. Several stages in the process are visible at once. For the most part, we are looking at the bare bottom planking. Caulkers are at work at the right. At the center, one man is applying tar. To his left, at the after-end of the waterline, some pieces of wooden sheathing are in place, with edges of the felt sticking out beneath them. Above, a complete band of sheathed and coppered bottom can be seen along the vessel's waterline; this may be new, or may have been far enough above the load waterline that it was in sufficiently good condition to have been preserved--although the white lines indicating a new caulking at the stern would suggest that the sheathing and copper were new.

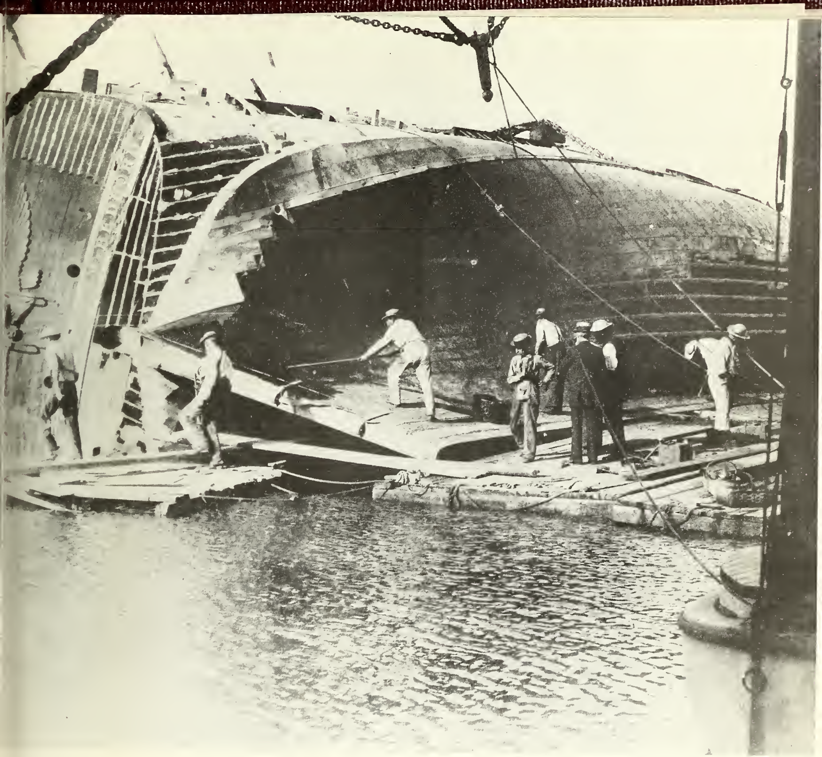
Heaving down a wooden sailing vessel to do this kind of bottom work was not uncommon at San Francisco in the late years of the nineteenth century. Figure 4.26 shows the ship **Alaska**, a vessel four times the tonnage of the **Sunbeam**, hove down by **Haviside**, the rigger. The location appears to be the Main Street Wharf, three blocks north of the Pacific Mail Docks.

One possible scenario for the events that led to the ship sunk in the mud at the foot of King Street can be constructed without recourse to exotic possibilities if it be assumed that the vessel had almost completed outfitting (including new sheathing, for reasons that Captain Klebingat offers below) at the Main Street or some adjacent wharf, had caught fire, had been towed clear of the wharf and shipping, and had been run up on the beach in the old Pacific Mail Basin to prevent her sinking.

The wooden sheathing on the King Street vessel seems to have been brand new at the time of her sinking. There was scant sign of the attachment of any marine growth--and no sign of holes made by marine borers. Thus, it appears all but impossible that the vessel lay exposed to tidewater for more than a few months before it was surrounded by fill. But why was there no yellow metal sheathing, except for a strip along the bottom of the keel shoe? Such metal was valuable and might have been removed from the vessel, as Captain Klebingat suggested in a letter--but it would appear very difficult to have stripped the metal where the bottom lay in the mud, and the new sheathing did not show the pattern of nail holes that should have been there had she been metalled. The nail patterns were in the old planking, underneath the new sheathing.

According to Captain Klebingat:

> *This sheathing on the ship. . . was done because it was an old ship. This was an old ship, and it started leaking. The butts were loose and the oakum worked out easy. So, all right, then they caulked it, then put felt on it, nailed this sheathing on it. Then after, they copper painted this on the outside. In Cook's time, they just used the wooden sheathing; it was the only way they had to protect the hull.*



Figures 4.25 and 4.26: Hove Down for Resheathing. . . .Above, the old whaler **Sunbeam,** at New Bedford, is resheathed and recoppered. Below, the big Downeaster **Alaska,** several times the size of a whaler, has the same work done alongside a San Francisco wharf. (Bancroft Library)

> *The worms would eat through the sheathing, but they didn't like this tarred Irish felt. I don't see any sign of the copper paint--maybe, as you say, they hadn't painted her yet, but most likely it has just sloughed off. Underneath, where this sheathing has fallen off, you see she was coppered, you can see the nail holes.*

(Maritime consultant Ray Aker has suggested that analysis of the pattern of the nail holes could indicate how many times the vessel had been recoppered, and it is obvious that the bottom had been coppered two or three times. In applying the copper sheets, the workmen, being usually very well practiced, would drive the nails at surprisingly regular intervals.)

Continues Klebingat:

> *She was an old ship, you can say. That sheathing proves that she was pretty leaky. Those grooves worn into the planking below the turn of the bilge . . . you say that you think they were caused by bilge water and grit sloshing back and forth for many years. Well, a good mate would try to keep her dry, pumped out all the time. But I can't see any other reason.*
>
> *Now, they talked about coppering the vessel, but as I was explaining, this wasn't in my time copper. It was Muntz metal-yellow metal, but not copper. As ships got old, and it was hard to keep oakum in the seams, they went to work and caulked the ship, and nailed this sheathing on it. They didn't put the Muntz metal back, they would copper paint this here. In later years we would put ironbark on the shoe there. You put yellow metal there because when she was on the ways, you didn't have to split out the blocks there to paint the shoe. So it protects the shoe all the time.*

In another letter in early 1978, Captain Klebingat addressed a second question relevant to dating the ship--that of the ship's construction and its peculiar treenail (or trunnel) form:

> *It was in 1925, when L. A. Norris of Sausalito bought the little schooner* ***Lloyd W. Berry****. She may have been thirty tons. She came out on deck of an American-Hawaiian steamer. Of course she was rigged down. As the* ***Melrose*** *was laid up, Lester Stone asked me to rig her up. So Billy Manning and I went to work.*
>
> *Of course I had a very good look at the little hull, and was astounded that the little ship was trunneled the same way as a large vessel. The trunnels went right through her hull; the planking and frames and ceiling were wedged the same way we do it; the wedges were driven vertically into the trunnel both on the inside and the outside of the hull. The only difference was this, that these trunnels were of oak and not black locust. And I noticed that there had been some seepage through the trunnels, which would not have happened if they were of black locust.*

> *And of course as I have said, all wedges into the trunnels were vertical, so that they would not split the plank. So these square pyramidical wedges in this King Street derelict are certainly uncommon, and you may say not shipshape. And no wedge on the inside. What stops the treenail from pulling if the timber should dry out?*
>
> *Treenails were turned on a lathe to a tight fit, so tight that the shipwright would steep the trunnel in a bucket of oil before driving it.*
>
> *The treenails of your vessel are shaped by a drawknife. I am sure this vessel was built somewhere near a farm and not in a shipyard.*

Later in the year, Captain Klebingat returned to the subject in another letter to the historical investigators:

> *Since arriving home, gave my observations some thought, and have changed my opinion.*
>
> *I believe that you are right; the vessel could not have been more than three hundred tons, if she was that large. I really consider her construction what we today call a "backyard job". Even for a vessel of three hundred tons, her planking is rather flimsy.*
>
> *Her bilges were filled with timber, but I am sure it did give her but little additional strength, but at that it left very little room for bilge water.*
>
> *The method of securing planks with "punched" treenails was unique to me, and I am sure that they do not use that method on the East Coast today. All those vessels built by Storey at Essex, Massachusetts, are trunneled the same way as we do it here on the Pacific Coast. No machinery was used in her construction to be sure, a sure sign planks and ceiling were sawn by a saw mill, maybe at a distant point.*
>
> *I told you how we secure a trunnel that cannot be wedged on the inside. I note that the wedge on the inside is missing on these treenails. They are made of a tough wood. Are you sure it is oak? Yew wood is a tough material and also Hawthorn. I have seen these woods used where extreme toughness was required.*
>
> *I did not see any sign of midships stanchions.*
>
> *There was no sign of marine growth of any kind at the hull, above that part that had settled in the mud. This may be due to the nearness of Shit Creek. Nothing could live in that fluid that floated the ships in the creek, consisting in great part of human excrement. I note that in former years people used to fish off Mission Rock (1870), as you have stated. But I never noticed any one so optimistic in my time.*

Turning his attention to the King Street Ship's construction and timber, Klebingat reflected:

> *I'll tell you one thing—that's some mighty fine ceiling. The widths of it, see. All that oak. This lower strake—what*

> *a tremendous piece of timber! In England, by the time this ship was built they had pretty much used up the timber this size. It's bound to be an American ship. What I am after is the tremendous width of that timber. If it were here on the Pacific Coast, it wouldn't matter, it would be common, there was plenty of Douglas Fir bigger than that. But this oak; that has me puzzled. It's from a tremendous tree. And don't forget the length of it.*
>
> *This is beautiful stuff. You can see it's an old ship because of different things. All that yellow metal fastening, for one thing. Now you take these floors: that alone proves that it took a tremendous old tree to get a timber like that. And that ceiling plank--24 inches wide, 4 inches thick.*
>
> *If she had been built on the Pacific Coast, they wouldn't have put that heavy ceiling there in the bottom, they would have put it up higher. The heavy stuff would be wasted down on the floors. You would put it up there at the turn of the bilge and above. They would have had a heavy wide plank at the garboard strakes, instead of this narrow plank. We generally had an inch heavier at the garboard.*
>
> *We wouldn't put that heavy ceiling on the floors. Any 2 x 12's would do there. Up at the turn of the bilge that heavy plank would give her some strength--a kind of girder effect. It gives her longitudinal strength when it is up on edge. Obviously, the builder thought that wide ceiling on the floors necessary; but I wouldn't consider it necessary. It's unusual.*

The recollections and thoughtful analysis of the details of the construction of the vessel brought to the project by Captain Klebingat opened up as many questions as they answered. But if there is one thread to single out as the most important in the development of his observations, it is that as he turned successively from one point to another, the age of the vessel appeared more likely to be greater than lesser.

TWO ARTIFACTS SUGGEST A TRAIL

The absence of any artifacts associated with the vessel lying in the sewer excavation was both frustrating, from the standpoint of identifying the age or type of ship, and odd, considering that some tool, or piece of marine hardware, or casual lost item would almost certainly be expected to turn up. It was the appearance of three on-lookers at the edge of site late in the afternoon of June 16 that revealed the reasons for the near complete absence of artifacts.

The Case of the Purloined Ginger Beer

As is more often the case than not, there is little or no understanding of the role of historical archaeology in the minds of the general public, which in this case included some enthusiastic collectors, who in truth did not realize that any archaeological monitoring of the sewer was being carried out. They did understand that they had no business going down into an excavation being carried out for the City and County of San Francisco, however, and therefore they apparently waited until the sewer excavation closed down late every afternoon before they climbed down into the trench to see what "treasures" they could find--treasures that they assumed would be either thrown away or collected by the construction workers who are known to appreciate the value of antique bottles, in particular.

Casual conversation on the evening of June 16 with the three on-lookers produced the information that the night before, they had climbed down into the excavation and worked their way behind the wooden lagging (see Figures 4.27 and 4.28), digging in the loose dirt until they removed an entire case of C. E. Watson Ginger Beer, complete and intact, 24 stoneware bottles, wire-corded and untouched. What was important is that they were able to pinpoint the exact spot that the ginger beer had been discovered, directly over the ballast.

The specific location meant that the case of bottles had not been found next to this ship or in the ship on top of layers of fill, but had been aboard the ship when she was abandoned, or (as seemed more likely), dropped accidentally into the water-filled hold some time later. Thus, if

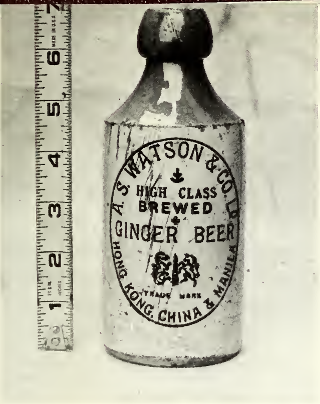
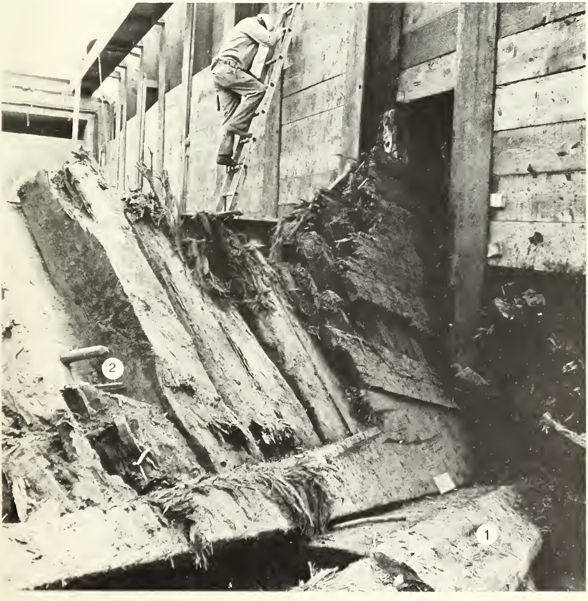


Figure 4.27: A Case of Stolen Ginger Beer. . .The entire case, corked with wires and still filled with high class A. S. Watson Ginger Beer, disappeared from behind the lagging (seen below in **Figure 4.28**). But even identified, the bottle did little to establish the date of the demise of the vessel--early guesses of from 1865 to 1880 were later modified to 1880, "or later." (John Kortum)

Figure 4.28: Keelson Lay in Undisturbed Position. . .Seen here extending into the south wall of the sewer trench, the keelson (1) provided a fix on the main axis of the hulk before the keel on the still buried side of the ship was exposed. "Treenails" (2), wooden fastenings which attached hull planks to the futtocks, were made of tough white oak. (John Kortum)



what the informants described as old stoneware bottles proved to be of a manufacture that ended in, say, 1875, it would be unlikely that the ship had sunk in 1900. Of course, it is not at all uncommon for a bottle of early manufacture to turn up in a dump of later bottles and materials, but a full case of filled bottles was not an item likely to have been lying around for years before it was for some reason transported to such a location and accidentally or deliberately dumped, all by itself. The case was most probably lost during the period its type was manufactured, or very shortly (a year or two) after manufacture ceased. At the same time, if it appeared that the manufacture of this particular bottle or brand did not commence before, say, 1885, then it would be extremely unlikely that the ship sank earlier.

As conversation continued at the edge of the site, the on-lookers cautiously revealed that the bottles were not for sale and that they did not want to be directly associated with the purloined bottles. A deal was nevertheless struck: a loan of one of the ginger beer bottles taken by an "acquaintance" in return for a loan of the publication **San Francisco Waterfront**, produced for the Wastewater Management by the authors a year earlier. The three-month loan turned into an exchange, and some informal education about urban historic archaeology protected the ship remains from further exploitation. (It should be added that these experiences demonstrated that an excavation conducted down the middle of the city streets cannot be effectively fenced from determined intruders even with night guards.)

The first "bottle expert" to informally assess the C. E. Watson stoneware bottle of "high class Brewed Ginger Beer . . . Hong Kong & Manilla" set the time frame for that particular label and manufacture from as early as 1845 to as late as 1890. This was subsequently revised to 1865 to 1910. The timespan was large enough to be absolutely of no help in narrowing the newspaper search for the King Street Ship. One bottle under question was examined by Chris Chaloupka, staff archaeologist of the State Water Resources Control Board, who wrote:

> *The stoneware bottle found in association with the **Lydia** is one of a general type, style and content not frequently encountered in the United States, even less the West Coast. Consequently, pottery ginger beer bottles are not well defined*

> *in the current literature and are only recently beginning to receive interest from collectors. In contrast, ginger beer was a popular beverage in England, where it was marketed in stoneware bottles as late as the 1930s. Sailing ship captains apparently had a preference for cargo containing stoneware bottles (as opposed to glass) because the ceramic containers were heavier and therefore were better ballast (Munsey 1970: 135). This may account for some of the container longevity and it may also be a possible explanation of why a case of ginger beer bottles was found aboard (?) the* ***Lydia****; there may even be more.*
>
> *I was not able to find any information on the brewer; however, the potter, J & C Price & Brothers, was in business in Bristol, England, from circa 1735-1740 to approximately 1907 when they merged with J. M. Powell & Company to form the pottery of Price, Powell & Company (Jewitt 1970: 88). Both the firms were leaders of the British ceramic industry.*
>
> *The ginger beer bottle is both dip-glazed and slip-cast (rather than wheel-thrown). Dip-glazing was introduced by the J. M. Powell & Company enterprise in 1835 and slip-casting became the production technique after 1860. The oval Price/Bristol hallmark with the central letter "P" was in use by 1883 (Herskovitz 1978) and cannot date before 1865, when their mark was linear with Price above Bristol (see Switzer 1974: 13). Unfortunately these various technological timemarkers do not allow for any conclusion beyond that the bottle is post-1965. Ceramic bottles illustrated in one of the various references that I consulted (Mumsey 1970) all bore glaze-covered, ink-stamped labels and were noted as being from the "1880-1890" period. Earlier stoneware bottles were apparently embossed or paper-labeled. In addition, early (1860-70) ceramic bottles are frequently not symmetrical and often have air bubbles in the glaze. Therefore our bottle seems to fall into the 1880-1890 category, possibly later. Given this, in conjunction with the context in which it was found, it is therefore reasonable to conclude that it is of late manufacture.*

The Notched "Nameboard"

Throughout the excavation, constant queries were addressed to the investigators as to the possibility of encountering some part of the vessel that would have its name emblazoned on some surface. Because it was clear that we were working somewhere near the midsection of the hull, such a find seemed all but impossible. Presumably, the main beam in the way of the main hatch would have had a register number and tonnage punched or carved into it--but the hull had been destroyed down to the level of the turn of the bilge.

On June 20, as the section of the vessel was being raised from the ground, a curved board was uncovered at a depth of 18 feet, directly beside the hull but not attached to it (see Figure 4.20). Measuring about 20.5 inches long, slightly bowed, with a 2-inch notch in the middle, the redwood board was impressed with the name **HOWELL WHITE FU? RING 9275 UIWB.** The lettering appeared to be stamped with metal die letters, with an amateur's eye for spacing. Furthermore, the maker had practiced the letters E, F, G, H, and I on the back of the board. The board had a worn diagonal crack across the face obscuring the third letter, which had a serif at the top indicating the missing letter to be a B, D, P, or R. One fact seemed obvious: this was not the work of a ship joiner, carpenter, or boat builder; rather it was either an informal exercise in defining ownership, or a case of somebody "just tinkering."

The notch on the board was worn and uneven, and there appeared to be no logical way that the board would have been attached to something larger--say a seaman's chest or bunk. No nautical association, in the formal sense of the word, could be made with its size, shape, or character. Still, there was a name, there were numbers and four letters--as do exist in the international code required for all ships. Furthermore a check of **Lloyd's Register of British and Foreign Shipping** showed that small boats, life preservers, and other potential flotsum were ordered to be marked, so that if a ship were lost at sea some identification would be possible even from the pieces of the wreckage.

Although the board had not been attached to the hull, its close association at this very early stage of investigation demanded that every possibility be tracked down on the remote chance that the ship's identify could be discovered. It was assumed that the name of the vessel could be: **HOWELL WHITE, FU? RING, FO? RING, RING, WHITE,** or some other variation.

It was also possible that Howell White was the name of the sailor who made the nameboard, or that of the captain or the owner, and that the name of the ship was the last word, or words obscured by the diagonal crack. It was also assumed that 9275 might be the register number assigned to the vessel, and that the letters UIWB might be the four international code letters.

The **List of Merchant Vessels of the United States** was started in 1868, and the third annual report (1871), on file at the National Maritime Museum, was checked, as it contained the most inclusive early list of vessels. The 1871 list consolidates the earlier lists that were first published in June of 1868.

The number 9275 was found to belong to the **F. St. Clair Edwards,** a ship which appears in the earliest **List of Vessels** (1868). It is described as follows:

#9275 H. G. P. K. Sch. **F. St. Chair Edwards** 304.47 tons
Great Egg Harbor, New Jersey.

By 1873, the Schooner **F. St. Clair Edwards** was registered at Somer's Point, New Jersey, and by 1874 and again in 1876, she was again listed at Great Egg Harbor, New Jersey. By 1880 there was no listing for the **F. St. Clair Edwards,** nor were there any subsequent listings. We may, therefore, presume that she was lost between 1877 and 1880 (or withdrawn from service.) The possibility occurred to the researchers that the name might have been changed and the number reassigned, but these possibilities were checked and did not occur.

The **F. St. Clair Edwards** was not listed in **Lloyd's Register of British & American Shipping** for the years she appeared in the **List of Merchant Vessels of the United States,** or for earlier years. This was not uncommon with American ships of this period. However, it was noticed that four-digit numbers starting with the number "9" referred to vessels whose names started with the letter **"F"** and the "nameboard" letters **FU? RING** took on added interest. For example, the **Farmer** was #9337, built in Canada in 1851; the **Fremont** (9520) was an American ship, built in 1850; the **Francis C. Smith** (9375) was built in 1854; the **Frank Herbart** (9121) was built in 1855, the **Franklin Nickerson** (9117) was built in 1854, and the **Fred Tyler** (9477) was built in 1848. All the above information came from a later **Lloyd's Register** that had begun to list all vessels by date and nationality, so that it was possible to go through U. S. ship lists and find the signal number and then find the date of construction. All U.S. vessels with five-digit numbers were built in the late 1840s or the decade of the 1850s, and were all either of United States or Canadian register. However, ships built after 1874 were given longer numbers, e.g. 114067. Older ships, like the **F. St. Clair Edwards**, continued to keep their old identification numbers.

The possibility that we were dealing with the **FU? RING**, an American ship built in the 1840s or '50s, became another clue to follow. The next check involved combining every combination of names through the **List of Merchant Vessels of the United States** and through **Lloyd's Register** for foreign vessels. Also, the check for any combination of signal letters like UIWB could be accomplished at the same time.

In the 1840 edition of **Lloyd's** no signal numbers or letters were given. This search then was limited to names and any construction information (like copper fastenings) that we might find. A complete and systematic check was made of every ship starting with the letters H, W, F, or R for every year from 1840 on through the 1920s. This included name changes and additional information as it appeared in later years. The only ship's name to persist was that of the **Ring** which appeared in 1852. The **Ring Mahon** was listed as a castle bark of 164 tons, built in Cork, Ireland, in 1825. The **Ring** was a schooner of 78 tons built in "N'tgly" in 1851 and fastened with "I.B." (Iron Bolts). The **Ring** would have been too small to match the King Street Ship, and the iron bolts eliminated her from any possibility of being this copper-fastened vessel. The **F. Edward**, a brigantine, with T. Clarke as master, measured 116 tons, was 82 feet long, 22 feet in beam and 10 feet in depth, and was built in 1864 by P. E. Isl. Kirh'm. This vessel continued to be listed through 1873, but by then had the signal number 50887.

By 1875 the **Fusing** appeared, with the number 65628, H.B.D.J., but it was eliminated as a screw steamer of 532 tons. In 1891 the **Forening** appeared as a wooden three-master of 221 tons, built in 1869. But these names were only tantalizingly similar.

If the search through **Lloyd's** revealed no ship that could fit the notched nameboard, it also revealed that UIWB had never been the international code for any ship.

It was not until August 4, 1978, months after the registry search began, that we received confirmation from the Forest Products Laboratory as to the identity of the various wood samples taken from the vessel, indicating that this ship contained yellow pine, "probably a species of hard southern yellow pine" that was used in the upper hull planking, a lower clamp, the keelson, and an upper futtock. The resulting identification of the ship as an East Coast American-built vessel left only one other list to pursue.

The Works Progress Administration had provided a small boom in local history in the early 1930s, and one of its projects was the pulling together of lists of American ships registered in various ports from the earliest times forward. These typescript volumes attempted to list all the ships registered in New Orleans, Eureka (California), Boston, New York, Providence, Portland, Newport, Plymouth, and San Francisco. The San Francisco compilation was interrupted by World War II, and the original documents for B through J were lost in the shuffle. Thus, any vessel like the old **Fu_ring** was lost from the records. However, it was hoped that some clue would emerge about the early ship registration, when it was built and sailing out of an eastern or southern port. No such evidence turned up, however, in spite of a complete search of materials at the National Archives in San Bruno, California, and the Documents Department of the University of California at Berkeley Library, nor was there a trace of the **F. St. Clair Edwards**, a fact which would indicate that these lists are not complete and fully reliable sources.

Putting aside the possibility that the **HOWELL WHITE FU? RING 9275 UIWB** referred to the ship, we checked the San Francisco city directories for some other clue as to the identity of "Howell White." It was at this same time that Chris Chaloupka, staff archaeologist for the State Water Resources Board, came up with part of the explanation of the notched "nameboard": the missing letter with its odd spacing is another "R," and the word is **"FURRING"**, a building trades term meaning to attach wooden sheathing. The notched board, worn from use, was used as a tool to remove a hot tar bucket from the fire and perhaps later hung over the bucket's edge in the furring operation in repairing ships.

The vessel had new wooden sheathing on it and Irish felt underneath that was applied with tar. It would seem that the redwood tool might in some way be connected with the nearby Tichenor's Ways ship repair operation, or perhaps with the repair of this particular vessel at the time it burned and was abandoned.

Now, Howell White took on a new significance in dating the demise of the ship that may have caught fire at the time it was being repaired. Howell White might be a company name of two partners in the ship repair business, or it might be a single name. The San Francisco city directories never listed a Howell White, although there were several H. Whites. J.H. White is listed in Langley's **City Directory** of 1868-69 as a manufacturer of machine oil and grease. At about the same period, L.V.H. Howell was a commission merchant from 1865 through 1868, but the precise nature of goods he shipped remains unknown. Cape Ann Copper Paint was sold by Gott & White in 1886 at 19 Steuart Street, an address convenient to the paint and lumber dealers as well as the shipsmiths and ship chandlers. One partner was Howard R. White, who was formerly captain of the steamer **Neptune** in 1870, and captain of the tugboat **Lookout** in 1876. He had the **Donald** in 1880 and was manager of the Merchant's Line of towboats in 1881. During this same period he was sometimes listed as "Agent for Cape Ann Copper Paint," which was coming into use as a substitute for expensive copper plating on ships. Copper bottom paint would have been used in combination with the tar and Irish felt and wooden sheathing found on the King Street vessel, not an uncommon practice, especially in making cheap repairs for older vessels. Still, where was a connection between H. R. White, as an agent for copper paint from 1881 through 1886, and some Howell? Or one of the other numerous Whites?

There were of course numerous possible connections, such as L.V.H. Howell (a commission merchant from 1865-1866) and Harvey G. White (a ship joiner at the same period), or Thomas White (a sparmaker) or Henry White (a carpenter). In 1875, there was a Jefferson Howell, who was listed as a master mariner, and a J. H. White who was a joiner with the Pacific Mail Steamship Company, and this was during the period that H. R. White was master of the tug **Lookout.** By 1877-78 the city directories listed Thomas Howell as a tinsmith at 537 Third Street and Patrick White as a boat builder at nearby Berry and Third streets.

The Howard R. White connection with copper paint and the Merchant Line tugboats, together with the Merchant's towboat connection with the Merchants' Drydock (see Figure 5.03), proved intriguing, because of the association of copper paint and ship repair. The Merchants' Drydock had been at North Point until the commencement of the construction of the new seawall, starting in 1879, when it was moved to the Spear Street Wharf, not far from the Pacific Mail Dock. Ship repair, furring, and the application of copper paint seemed to tie together. But in tracing Howard R. White down through the years, no Howell connection develops in the city directories. By 1887, White was master of the famous ferry steamer **James M. Donahue**; his partner in the paint business, George A. Gott, was now with Sisson, Crocker & Company, on O'Farrell Street, involved with general merchandise. There was no further mention of Cape Ann Copper Bottom Paint. Captain Howard White continued as Master of the **Donahue**, and in 1899 the ferry **Tiburon**. By 1908, H.R. White was listed as Master Mariner, with an address at the Ferry Building. Perhaps he was now a relief skipper with the ferries.

Thus, no Howell White nor Howell-White is established at any time from the 1860s through 1910 in the San Francisco city directories. At the same time there are some Howells and many Whites who may have been involved in such an informal waterfront business combination as to not be listed in the directories as a partnership. Would the UIWB or 9275 connect up in a business association with any Howell or White? The four-digit number accords with the San Francisco city telephone system which by the early 1900s had reached the point that 8000 and 9000 series numbers were found in the book--though in comparatively few cases. Scanning page by page through the telephone books of this time picked out 9000s but no 9275 was found prior to the cut-off date of the construction of Section 12 of the seawall in 1908.

As for the UIWB, a fairly obvious thought, given the assumption that the "nameboard" was an idle or perhaps humorous exercise, was that the initials might stand for one of the extremely numerous fraternal organizations, trade brotherhoods, or other associations with lofty names that were so common in the late nineteenth or early twentieth centuries. "UIWB" might have been "United Industrial Workers Brotherhood, "United International" something, or, close to home, "Union Iron Works Brotherhood." But nothing turns up in any of the directories that fits these initials.

Given the lack of conclusive evidence on the name, numerals, and letters on the board, one must thoughtfully consider the point that the legend was possibly engraved on the spur of the moment with borrowed dies belonging to some person working in the same place at the time. There may be some element of frivolity in the inscription. If so, the maker would no doubt be pleased to contemplate the length to which historians in 1978 puzzled over his lunchtime graffito. On the other hand it may well be that the board had a serious business intent to identify a perhaps small informal waterfront partnership that simply did not appear in San Francisco's city directories.

SEARCHING FOR A STORY AND A NAME--EXPLORING THE "TICHENOR'S WAYS" THEORY

Captain Klebingat had remarked, "Surely, there would have been a newspaper account of a fire on a ship," and it did appear that the King Street Ship caught on fire and was pulled (or pushed) away from the pier to avoid a larger fire or endangering other shipping. Then, because it was old, considered beyond repair, or for some other reasons we could not even speculate upon, it was abandoned, stripped (perhaps), and filled in, around, and over.

One strongly advanced theory--made before the second excavation in 1980--was that the ship was being repaired in connection with Tichenor's Ways, and when the ways were abondoned about 1871, the old ship was left behind. Because all fire department records prior to San Francisco's big 1906 fire had been destroyed and the shipwreck files at the National Archives were spotty and incomplete, the next step was to go through all the ship files at the California State Library made in the 1920s, looking for ships that burned in or about San Francisco, a laborious process completed without success. A list of ships that burned in and around the waterfront was followed up, but each ship was eliminated after reading the newspaper story from which the state library file card had been made. It must be remembered that index files regarding ships are almost always by name, and since the name was unknown--only the location, the general type of ship, and the probable cut-off dates of the ship's demise (1867 to 1907) were known, the newspaper search was seriously affected.

San Francisco commercial weekly papers were considered as a source but proved too specific to trade interests and not necessarily apt to include consistent coverage of waterfront fires and accidents to ships. Nor were there available ship fire insurance reports. Harbor Master reports were checked for this class of information, as were City and County of San Francisco Municipal Reports and Biennial Reports of the Board of State Harbor Commissioners (which even listed such mundane details as amounts spent for toilet paper for wharfinger's offices). Scrapbooks kept by waterfront collectors were also gone over for any clues as to this particular locale. All to no avail.

Thus, it was decided to start a search of the **Alta California** from 1868--when Tichenor's Marine Railway was still in operation, but presumably winding down until it was no longer in use as a ship repair center in the basin of Pacific Mail Dock--through 1870--when the building of the Central Pacific ferry slips at the foot of Second Street would have effectively closed off the southern entrance to the basin. The **Alta California**, a San Francisco daily that exists in a complete run on microfilm, tended to be the most reliable paper of the times--that is to say, it was a good general paper, not apt to overlook the demise of the vessel in the excitement of pursuing some particular political bent. The paper generally ran no more than 6 to 8 pages, so that the physical problem of reading 365 daily issues for several years, while large, was not extremely difficult. Notes from this period of San Francisco waterfront history would prove valuable to scholars, would pin down the uncertain date of the closing of Tichenor's Ways, and would describe the activity of this interesting period of transition in this area. While it was not as likely to reveal the identity of the ship as a search of city newspapers from 1900 to 1907, before and during the construction of the seawall's Sections 12 and 13, turn-of-the-century San Francisco newspapers ran to 20 pages or more, which would mean searching tens of thousands of pages of type on microfilm. Fatigue itself might well lead to overlooking the pivotal feature story. Thus, the potentially more promising search was postponed until a review of the earlier years of the **Alta** were completed.

Notes from the Alta California, 1868-1870

In searching the daily **Alta California** for notices about the activity at Tichenor's Ways between the time that A. A. Cohen was negotiating for the purchase of the property in 1868, and the construction of the extensive Central Pacific ferry slip and works in 1870-1871, it was found that building and repair activities during this transition period were quite intense rather than declining. This was true despite the changing ownership of the property and the intentions of the owners being certainly obscure, and perhaps uncertain. Cohen's construction of the ferry slip in the fall of 1868 was preceded by a sale of the property that was not generally known.

We will not attempt to trace the true nature of the relationship between the various parties whose activities are perhaps obscured as much as they are revealed in the case of the **Central Pacific Railroad vs Alfred A. Cohen** (October 1876), but some dates and names do come out clearly. It was in July of 1868 that Tichenor sold the major interest in his property to William C. Ralston, San Francisco's leading financier, together with Cohen and others, in a typical Ralston deal involving a small consortium of associates. It was probably the intent of this group, from the outset, to sell to the Central Pacific (or one of it's "front" organizations)--probably in connection with some arrangement that would give Ralston more leverage in trying to get a portion of the action in what was obviously turning into the biggest game in the state. Whatever was going on here, the Central Pacific **did** acquire the Tichenor's Ways property for actual construction of the San Francisco freight terminal in 1870. All of these operations contained those "wheels within wheels" that the San Francisco press attributed to the Second Street Cut fiasco of 1869, which provided the direct access for heavy drays to the Second Street Ferry slips.

The dates mentioned above give us the points at which Henry B. Tichenor was himself easing out, at a huge profit on the value of his land as a marine railway. What they did not tell us was that the marine operation itself showed a last burst of great activity, with such famous San Francisco shipbuilders as Domingo Marucci and Patrick Henry Tiernan building and repairing major vessels on the fill at the foot of Second Street. It would appear that the connections, money, and needs of Ralston and the Central Pacific moguls simply added to the normal repair business that Tichenor would have conducted.

The first dip into the **Alta** produced confirmation (if any was needed) of Roxburgh's colorful story out of the **South of Market Journal** in 1933, which remarked that the beach of the foot of Second Street was where they had hauled up the whale and charged 50¢ to see it--"business was fine until the whale got over-ripe." What was the date of this boyhood memory? It was the first of March, 1868:

> **A Leviathan of the Deep.**--The whale which wandered in through the Golden Gate and was seen in the bay at different times, was hauled up on Tichenor's Ways, on the foot of Second Street, last night, having been captured by a boat's

> crew from the whaling barque **N. S. Perkins.** The monster is a cow whale, of the humpback species (**Alta**, March 1, 1868).

The **Alta** "whale" feature story made a mental connection with Edward Vischer's **Pictorial California**, a colorful promotion of the curiosities and wonders of California in the 1860s. Knowing that the folks back East simply could not get enough of the curiously wonderful new far country, Vischer had the simple idea of mounting copies of photographs, lithographs, and drawings of every kind of scenic or newsworthy view and binding these together in large portfolios suitable for drawing-room viewing from Boston to London and Philadelphia. No two volumes were alike, depending on how many prints he happened to have on hand at the time, but sandwiched between a waterfall in Yosemite and the raising of the Civil War monitor **Camanche** was a curious view of a medium large whale, harpooned with numerous punctures, and surrounded by a curious crowd that included a hoopskirted lady standing up on a chair for a better view. All in all, a head count reveals that the promoters made $12.50 during the photographer's visit. What is of greater interest is that the whale is resting on a marine railway. What is even more curious is the small figurehead of a crouching man mounted on a mast in the background left. His presence confirms beyond a doubt that we are looking at Tichenor's Ways in March of 1868. A careful examination of the image reveals the little crouched figure mounted on the mast of the hulk with a house built on the deck, and to the left a nondescript house that apparently appears in Figure 4.29. Although Vischer copyrighted the volume of bound prints in 1870, the date on the view is 1868, which corresponds to the **Alta** story. It is doubtful if either of the two top-hatted promoters standing in the jaws of the leviathan of the deep was H. B. Tichenor. Thanks to the whale, we do have a view of the beach at Second Street in 1868--just at the time our search for the King Street Ship began.

On April 14, 1868--by which time the smell of the whale must have died away--"Ship Building at South Beach" made a front page feature story in the **Alta**. "No less than three fine propellers are in the process of construction, together with two sailing craft, to say nothing of small-fry being rebuilt and overhauled." The most notable steamer amongst the propellers was a 200-ton vessel, which was hoped to obtain the unheard of speed of 18 to 20 miles an hour. The "Company of gentlemen and capitalists" who intended to use the vessel to assist ships in distress or carry pleasure parties to any point were not identified. From the description of the vessel, however, it is apparent that it was William C. Ralston's new steam yacht Brisk. Domingo Marucci was building her, as well as the other steamers, which suggests that Ralston was already involved in some arrangement for the purchase of the property from Tichenor. The **Brisk** appears in the photograph of August, 1868 (See Figure 4.05), where she is already being rebuilt, her patent boilers having proved incapable of furnishing the steam power required to match either her name or the expectations of the owner. Marcucci lengthened her enough to install conventional boilers, though even with this modification he allowed that "she never proved very brisk" (Ms., Bancroft Library Scraps).

The typical type of minor marine disaster that kept the railway busy occurred the same day as the story about all the shipbuilding at Tichenor's. The tug **Sol. R. Thomas** got the hawser of his tow "wound up in the propellers," and herself had to be towed in to the ways (**Alta**, April 14, 1868).

A big job of ship repair at Tichenor's appears in the **Alta** for January 22, 1869. The Russian-American Fur Company's iron steamship **Constantine** was up for replacement of frames and floors and a good part of her bottom, with 35 men working on her in the yard and 12 more at the Vulcan Iron Works, which was supplying the frames and plates. The **Constantine** had run ashore in British Columbia. Apparently there was no repair facility large enough to handle the vessel in the Northwest, for she was so badly damaged that at Victoria, "a jury keel was put in and her bottom stuffed" in order to get her to San Francisco. The **Constantine** had been slated for repair at North's shipyard on the Potrero where "a new cradle was built . . . for the reception of the steamer, but not being sufficiently strong, it gave way under her enormous weight" (**Alta**, January 13, 1869).

Notes in the **Alta** on June 2 describe a new freight steamer for the Central Pacific Railroad being built at Tichenor's. On August 12, "quite a number of men are employed at Tichenor's Ways . . . building a schooner, scow, a dredging machine, and repairing a brig." The week before, a

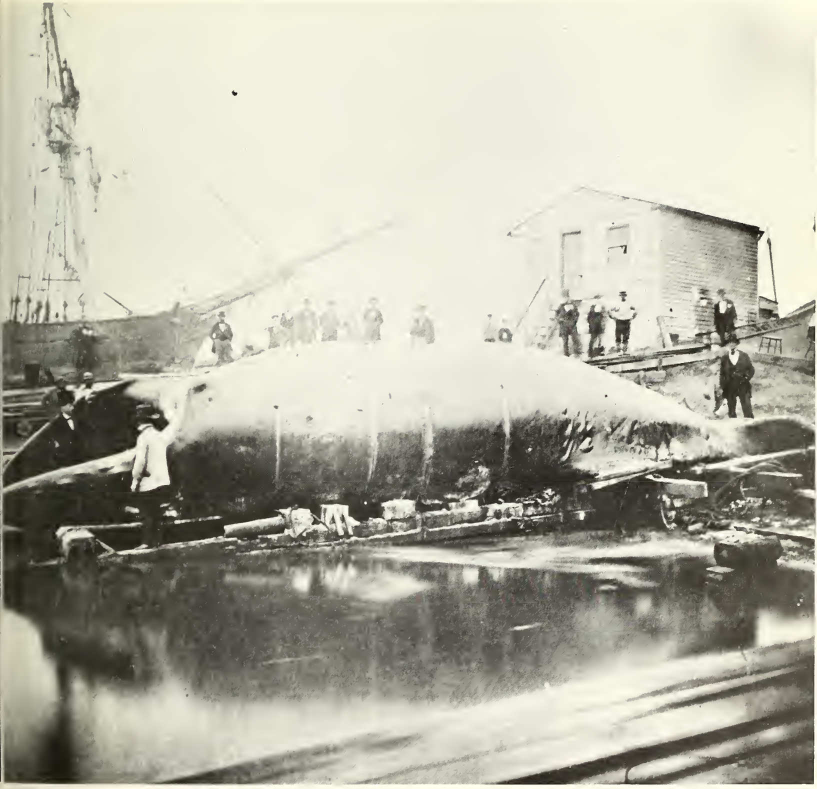


Figure 4.29: A Stranded Whale on Tichenor's Ways, 1869. . .It was worth 50¢ for a close view--even the hoop-skirted lady stood on a chair for a better glimpse of this leviathan stranded in the bay and brought in for closer inspection as one of the wonders of the deep. The strange little 'man on the mast" at the far left background marks this as Tichenor's Marine Railway and can be seen again in Figure 4.02. (Bancroft Library)

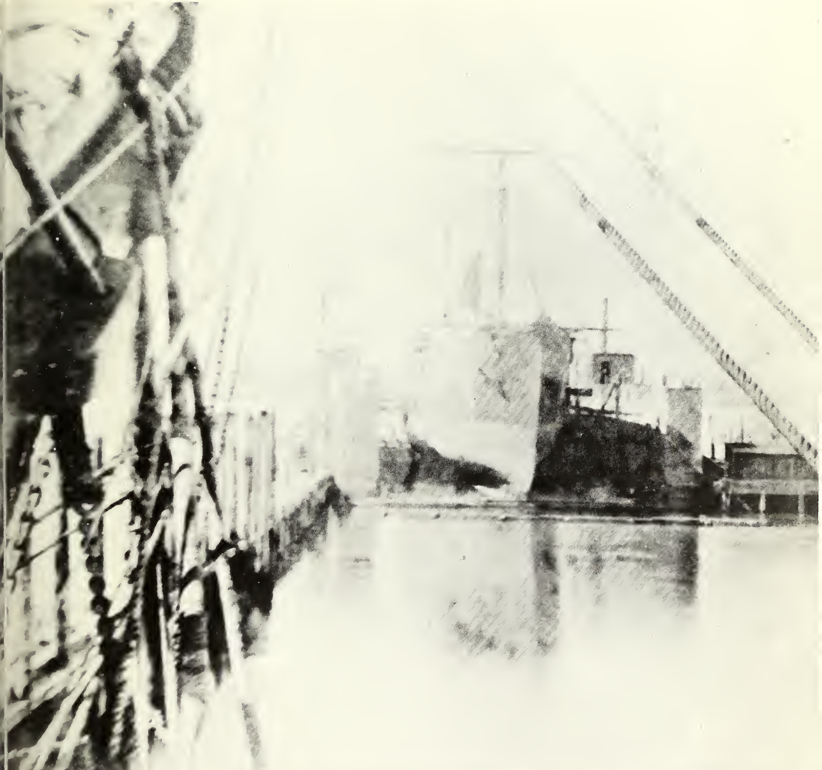


Figure 4.30: The John Jay in Dry Dock. . .Identified as being at "the Foot of Second Street," the floating dry dock may acturally have been installed by H. B. Tichenor at Mission Rock in order to meet the terms of his state grant of that valuable waterfront warehousing site. (California Historical Society)

staging used in repairing the **City of New York** collapsed, dropping twenty workmen into the bay (**Alta**, August 8, 1869). The schooner **California** was launched on August 24.

The **Alta** always expressed a high interest in any "old" or "historically interesting" vessel. Perhaps the most relevant story that involved our site had to do with the **John Hancock**, a government vessel built in 1844 at the Charlestown Navy Yard in Massachusetts. In March of 1869 she was being converted into a lumber schooner, having passed through the hands of the California Steam Navigation Company and thence to Messrs. McPherson & Wetherbee, "well-known lumber merchants." Her boilers were being taken out, and she was being converted into a barkentine suitable for the coastal lumber trade. The "trade comments" about her condition bear repeating:

> Upon overhauling her, the timbers and frame are found to be in every respect solid. She was built of white oak and at a time when "shoddy" work was unknown. Experienced ship carpenters say that today she is as staunch and substantial a craft as floats in these waters. She has a complete suit of heavy copper, and is copper fastened throughout. To fit her in the business in which she is to be here after employed, she will be thoroughly caulked and planked, taken on the ways, and everything which a lynx-eyed ship carpenter can discover that is necessary for her improvement will be done . . . (**Alta**, March 12, 1869).

This was the second rebuilding of the **John Hancock**, the first having occurred when Commander Ringgold, in 1853, had her hauled up in the Boston Navy Yard and lengthened by sawing off both the bow and the stern and having new ones put on, increasing her tonnage from 230 to 382 tons and her cost to $76,521. Ringgold and Commodore Rogers used her for ocean surveying expeditions (**Alta**, March 15, 1869).

Nor were the **Alta** stories limited to important shipbuilding operations. On February 12, 1869, we read:

> **Fire on Board the Steamer Sacramento**
>
> Yesterday afternoon, about 4 o'clock, a fire broke out on board the P.M.S. Co.'s steamship **Sacramento,** lying at the Company's wharf, foot of Second street, which, had it not been for the promptness of persons on board would doubtless have resulted in a serious conflagration. It appears that attempts have recently been made to rid the vessel of bedbugs, roaches, and vermin, generally and during the process a large

> number of life-preservers were stored in the men's second cabin and saturated with a fluid used in the process. A cabin boy carelessly placed a lighted lamp upon the preservers. . . .

Any fire worthy of an alarm made the **Alta**, but there is no record of any vessel burned and beached at the foot of Second Street to later sink in the Pacific Mail Dock Basin during the most likely time of Tichenor's operation--that is, as he wound his marine railway operation down in favor of the railroad business he was moving into. He was the builder of the Los Angeles and San Pedro Railroad and gained control of the operation in 1868, which he continued to operate "with great financial success until 1873" when he sold it to the Southern Pacific, presumably again with great financial success (Phelps 1881: 402).

Last Notes on Tichenor's Ways:

By October 14, 1870, a listing of manufacturers and mechanical industries from the assessor's rolls shows the existence of two small marine ways (capacity of 8 tons), a floating dry dock owned by the California Dry Dock Company (with a capacity of 1800 tons), and the Hunter's Point stone dry dock, but it does not list Tichenor's Ways. The obvious explanation is that construction of the new Central Pacific car ferry slip (not to be confused with Cohen's Oakland & Alameda Ferry Company slip of 1868) had proceeded to the point that the space for the marine ways was no longer useable.

Further evidence of the withdrawal of Tichenor's Ways from operation is found in a State Tidelands Commission grant of Mission Rock to Henry Tichenor at about this time, for the purpose of constructing a marine railway. Perhaps Tichenor actually did intend to pursue the relocation of a facility so important to the advancement of commerce and navigation. But, in fact, Tichenor used Mission Rock as a foundation for an offshore wharf and warehouse complex to serve the needs of the rising California grain trade with Europe. The tidelands commissioners made a preliminary survey that established that some 14 acres of submerged land around this outcropping were included in Tichenor's application (**Alta**, January 29, 1870). The state legislature granted the Mission Rock lands to Tichenor on April 4, 1870--with the provision that the "patent shall not be issued until said Tichenor . . . shall have constructed a marine railway or dry dock at said

Mission Rock" (Cal Stats. 1870: 801). It may be that Tichenor did meet the technical conditions of the grant by installing, however briefly, a floating dock alongside the rock. A photograph that we have had reason to puzzle over (see Figure 4.30) is identified as "Floating dry dock from Ship **John Jay**--Foot of Second St." Mission Rock was opposite the Foot of Second Street--but nowhere have we seen evidence of a floating dock **at** the original Foot of Second site of Tichenor's Ways.

It would appear that the last big shipbuilding job at Tichenor's Ways was the construction of the huge sidewheel railroad car ferry **Thoroughfare** (see Figures 4.31 and 4.32). **Central Pacific vs Alfred A. Cohen** brought out that the **Thoroughfare** was under construction in July and August of 1870, and that A. N. Towne, superintendent of the Central Pacific interests, was complaining that he had not enough room for operations. "Will neither love nor money give us what we want at Second Street? It seems of much importance that we have more room there" (**C. P. vs. A. A. Cohen** 1876: 41). The **Thoroughfare** (1,012 tons, 248' length, 38' breadth, 12' depth) was noted in the **List of Merchant Vessels of the United States** as being completed in 1871.

Some Negative Conclusions

Investigating the possibility that the ship at King Street may have burned or have been abandoned in that location during the last years of the Tichenor's Ways operation turned up, as one might have hoped, quite a lot of information as to the type of repair and building activity, and the scene in general, at the Foot of Second Street between 1868 and 1871. But no single scrap of news, photograph, or other reference suggested an accident there to a vessel of this size.

None of this proves, in itself, that the accident and sinking did not occur at that time. However, there are general physical arguments against the vessel having occupied for a period of 35 years a conspicuous location near the Central Pacific ferry slip in the Pacific Mail Basin. The more one looks at photographs, maps, and accounts of activities of the post-Tichenor's Ways period, the less credible the possibility of the ship remaining in this site seems to be.

The remains of the vessel would have been highly visible at low and moderate tides. One would expect, for example, that the South of Market boys who mentioned swimming off that particular beach, and who recalled the **Jules** and the **Jim** that Tichenor ran out to his Mission Rock warehouses, would certainly have mentioned the sport of swimming out to the "old hulk." Furthermore, we have not been able to find any visual evidence of the extensive marine borer damage that one would expect to see in the visible remains of the hull had she been exposed for more than a couple of years--though exotic arguments come to mind, such as the incredible foulness of the Channel Street effluent having been toxic to ship worms as far away as the Pacific Mail Basin.

The Coast Survey hydrographic manuscript sounding chart of this portion of the waterfront, made in 1895, shows soundings all around the arms of the ferry slips, the beach between Second and First streets, and the Pacific Mail Docks. But no notation as to the location of an old hulk appears--only the symbol "M" in the center of the basin, indicating the character of the bottom (mud). In short, a remarkable series of not very likely conditions would have had to have prevailed in order for the ship to have been sunk in this position for a long period of time prior to the building of the seawall in 1903-1905.

It must be kept in mind that the above research was undertaken prior to the decision to execute a test excavation on the southern side of the C-2 sewer alignment. The visual evidence from this second excavation, taken together with all of the previous archival and physical evidence, appeared to rule out conclusively the possibility that the vessel came to her present situation in connection with any activity at Tichenor's Ways.

A SECOND LOOK AT THE KING STREET SHIP -- 1980

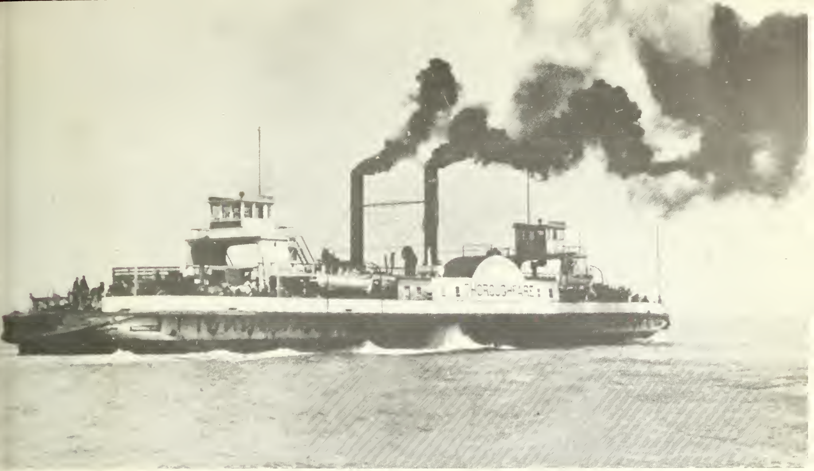
On a windy March day in 1980, nearly two years after the first encounter with the King Street Ship, a yellow backhoe swung its boom down, taking the first bite out of a trench marked by taut strings. Assembled at the edge of the trench, ready to go to work as the excavation proceeded--noting, recording, photographing, testing the soil with trowel and probe--was a small group of archaeologists and historians. The excavation, which came as a follow-up to the 1978 work, was undertaken to allow a controlled archaeological excavation of portions of the vessel not affected by the 1978 encounter, during which a portion of her midsection had been removed.

The site was unprepossessing, and the few passing motorists probably assumed that the excavation was related to the construction taking place on the C-3 sewer some three blocks away. A locked truck trailer, used to store construction materials for C-3, was the only "structure" on the triangular piece of land enclosed by King and Second streets and the Embarcadero. Heaps of steel sheet pilings were scattered here and there. In laying out the boundaries of the archaeological trench, the surveyors had determined that the ground surface was at about City Base level in elevation, with a gentle slope downwards toward the south and the Embarcadero. The point at the south end of the trench selected as datus point for all vertical measurements was elevation City Base minus 1.1 foot.

The ground surface at the site was covered by a single layer of angular railroad bed gravel, which obscured all traces of the earlier monumental construction efforts that had inadvertantly discovered the ship. The completed sewer culvert, measuring some 20 x 20 feet in cross-section, now lay beneath the ground surface. While the location of the ship and the placement of the archaeological trench were already determined, it was known that excavation to expose part of the sewer box would reveal several handy visual reference points to help locate the 1980 finds with reference to the 1978 work. For example, the soldier piles, whose position had been recorded in the 1978 site map (see Map 4.08) would have left an impression in the concrete on the outside of the sewer box. Since Piling #367 had been directly adjacent to the port side of the hull, its impression would provide a helpful fixed reference point.

The work being undertaken was limited in scope, restricted by funding, by its intended objectives, and by certain implicit restraints, such as the presence of a high water table. The primary purpose was to test the hypothesis, made in 1978, that the unimpacted portions of the ship lying to the south of the sewer trench were intact up to and including the top deck. While a prohibition in 1978 against removing the wooden lagging of the sewer trench for safety reasons had prevented observers from getting a good look at the upper segments of the hulk, it had appeared that the line of the hull continued upward in the south wall of the sewer cut, rising to within five feet or so of the ground surface. To determine whether or not the deck existed intact, measurement of its height with respect to the keel and the datus points and records of its construction and condition were the first items of business. A second major purpose of the test excavation was to uncover features of the hulk which would lead to the resolution of numerous questions left unanswered in 1978. On which side of the sewer trench--south or north--did the bow lie? Since archival research had failed so far to reveal the ship's identity, it was hoped that data would be recovered which would more clearly establish its size, class, and perhaps its last uses immediately before it sank. Finally, it was believed that stratigraphic evidence might provide a definitive resolution to the question of when the vessel burned and sank.

Funds for the excavation were limited, and Wastewater Management Program officials and the State Water Resources Board had restricted the extent of the excavation. Plans called for excavation of a single trench, to be laid out over the line of the hull immediately to the south of the wall of the sewer box. The "port" or western side of the hull was chosen (assuming that the bow lay to the north of the sewer trench), since the starboard side had burned and was buried deeper. Exposure of some 8 to 10 feet of the hull was planned. If the supposition were correct that the hull was intact to the deck on the port side, the segment exposed and recorded would reveal the waterways, part of the deck, and perhaps chainplates or stanchions and other topside features. While such an exposure was extremely limited in terms of the size of the entire ship, several of the authorities felt that the data gathered, when coupled with the observations of lower hull sections made in 1978, would provide enough information



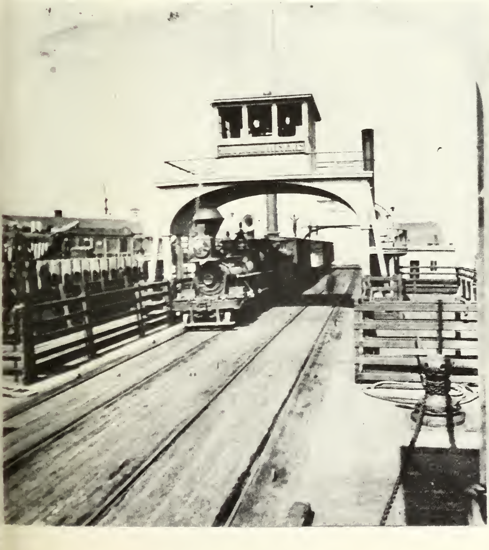
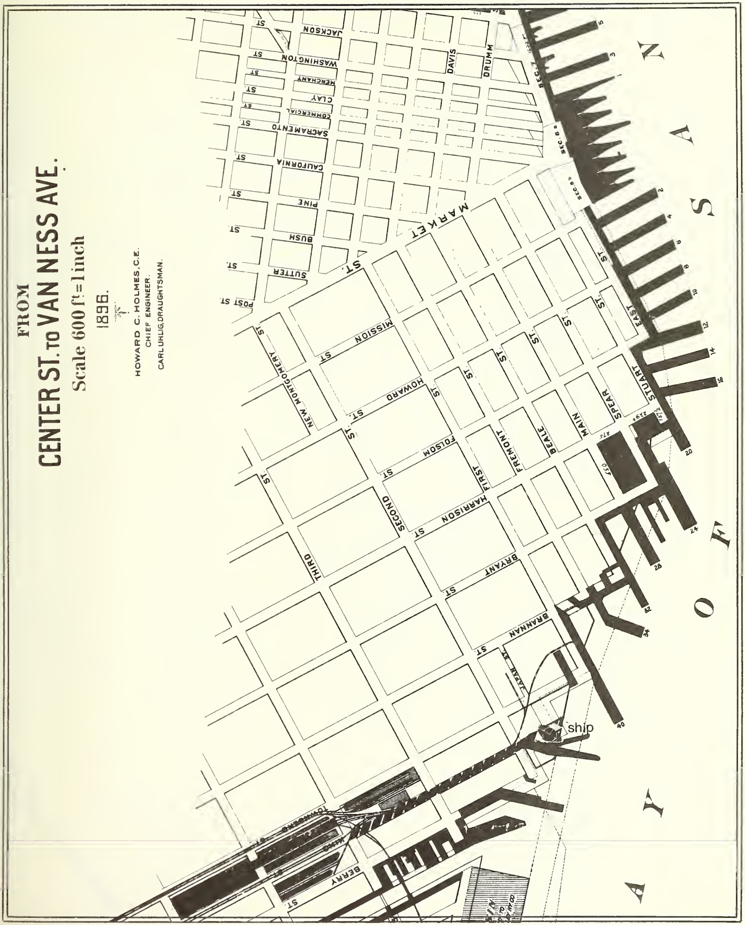
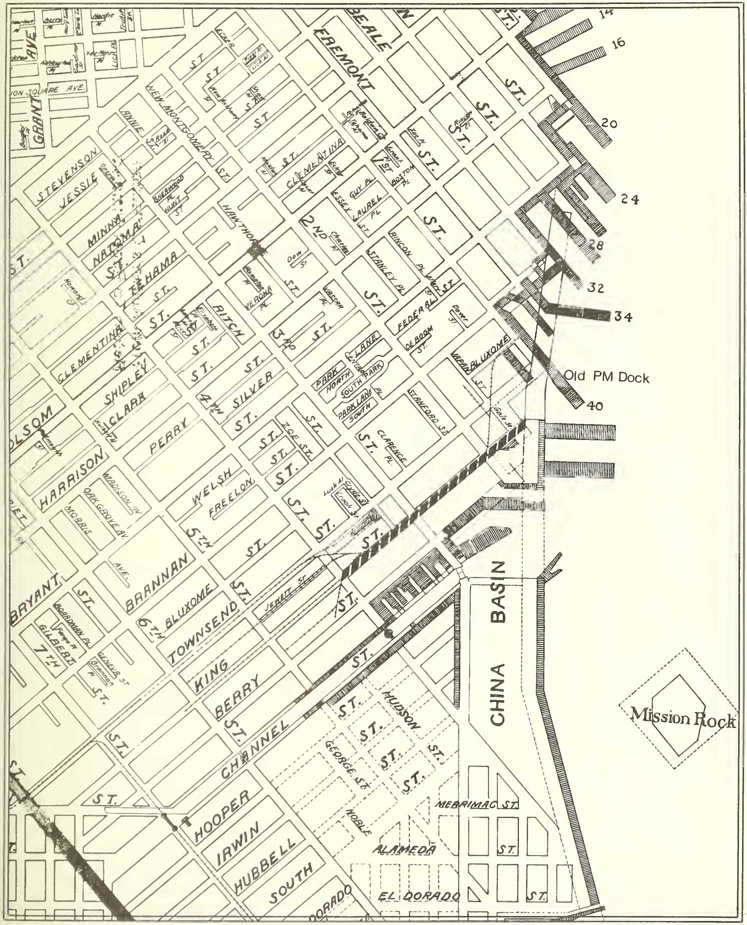


Figure 4.31: The Thoroughfare was Built by Patrick Tiernan at Foot of Second Street in 1870. . . It was a gigantic boat building operation, because this big, double-ended sidewheel car ferry was 266 feet long and built to carry 16 loaded railway cars. (Bancroft Library)

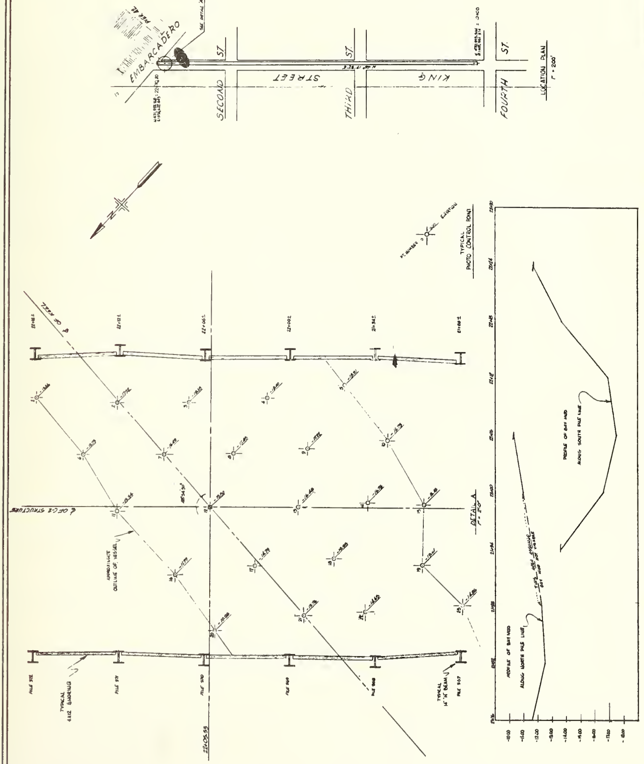
Figure 4.32: The breadth of the Thoroughfare in Action. . . The building of such a large vessel at Tichenor's Ways must have used all the space available and was probably the last big marine job on the site. (Bancroft Library).



Map 4.06: Detail from 1896 San Francisco Waterfront Map. . .showing Pacific Mail Basin before construction of new seawall. Fine dotted lines show projected seawall and Embarcadero.



Map 4.07: Detail from 1906 San Francisco Waterfront Commercial Map. . .showing the newly constructed (unnumbered) Pacific Mail Docks and Section 13 of the seawall. The old Pacific Mail Dock #40 is still standing, indicating that the company probably never lost a day's work because of seawall construction (see Figure 4.43).


EMBARCADERO
SECOND ST.
THIRD ST.
FOURTH ST.
KING STREET
LOCATION PLAN
DETAIL A
TYPICAL PHOTO CONTROL POINT
APPROXIMATE OUTLINE OF VESSEL
TYPICAL 4X12 SHORING
TYPICAL 14" H BEAM
PROFILE OF BAY MUD ALONG SOUTH PILE LINE
PROFILE OF BAY MUD ALONG NORTH PILE LINE
N

Map 4.08: 1978 Engineering Map of King Street Ship Site (San Francisco Wastewater Management Program).

to enable more reliable determination of the vessel's type and overall size. A very similar text excavation, carried out only weeks before when the same investigators had exposed the hull of a buried Gold Rush hulk at Levi's Plaza on the north waterfront, had demonstrated the feasibility of such an approach. (A report on this excavation is currently being prepared.)

An inherent limitation to the explorations at the ship site was the groundwater problem. With the waters of the bay kept away only by the porous rock construction of the seawall and 150 feet of fill, groundwater rose and fell with the tide, reaching to within about 6 feet of the surface at the excavation site. It was realized from the beginning that probably only 1 or 2 feet of the hull would protrude permanently above the groundwater line. While a small pump might be used with success to remove water from small areas of the excavation, it was certain that meaningful excavation below the water line was likely to be impossible.

A similar limitation to deep excavation was contained in California state safety regulations which specify that work at depths in excess of 5 feet must be conducted in shored trenches. Even supposing that water problems could have been solved economically, the restraint imposed by shoring requirements (or the alternative--sloping the excavation walls) would have created strains on already severe budget and time limitations. In short, then, the single trench excavation conducted in 1980 was foreseen as a useful, but limited, attempt to fill in some of the information blanks remaining from the 1978 encounter with the ship. It was undertaken with the foreknowledge that probably at most no more than a foot or two of the hull would be observable above the groundwater line and that a length of about 10 feet was all we might hope to expose.

Excavating to the Deck Level

Figure 4.33 shows the placement of the test trench and the grid overlay. The trench lies roughly along a north-south axis, aiming almost directly at Pier 42, across the Embarcadero. For consistency with the conventions of nomenclature adopted in 1978, however (see beginning of this chapter), the end of the trench lying nearest Pier 42, and over the stern of the ship will be designated south, with the north end of the archaeological trench being that nearest the wall of the C-2 sewer culvert. The original trench, 4 feet wide, was laid out between the grid lines designated "0' East" and "4' East." As excavation progressed, a four-foot westward extension of the trench was carried out, the west edge of which is marked by the "4' West" line of the grid. The grid point "0', 0'" served as datum point for the grid, and all stratigraphic features and the ship itself were recorded with respect to the grid based on this datum. For brevity, any given excavation unit in the grid is designated by the coordinates of its northwest corner. Thus, in Figure 4.33, the site plan, Unit 0'N, 0'E is the unit with the datum point as its northwest corner. It is bordered to the immediate "east" by Unit 0'N, 4'E. Excavation was initiated at the southern end of the trench and progressed toward the sewer structure.

Features were noted, described, measured with respect to datum, and tagged with flagging at the time they were encountered. Once overburden had been cleared, and the line of the hull located, the trench was given a string grid for ready reference. Thus, the grid system employed in the excavation of the C-2 ship, while conceived in terms of four-foot increments, served as a recording device rather than as the boundary marker for a series of discrete four-foot-square excavation units.

Datum plane for all elevations was defined as ground level at a point 33 feet, 10 inches south of "0' North, 0' East" on the center line of the trench. Elevation of this datum plane was City Datum minus 1.1 foot. City Datum or City Base is defined by the city engineer's office as 6.70 feet above the ordinary high water mark, and thus the datum plane for the excavations lay only 5.6 feet (67 inches) above the ordinary high tide line. With the waters of San Francisco Bay less than 300 feet away across the Embarcadero, it was anticipated that the groundwater level would rise and fall with the tides, with the high tide level found between 5 and 6 feet of the roughly level surface of the site. As discussed below, these expectations proved to be correct, complicating the problems of recovering desirable data about the hull.

Excavation to clear overburden was conducted using a small backhoe equipped with a 24-inch bucket. Deposits overlying the ship were known to post-date the completion of Segments 12 and 13 of the seawall, as explained above. Excavated overlying soil was unscreened, and no systematic artifact collection was carried out for several reasons. These included the short time allotted to the field portion of investigation, the fact that the overburden consisted of landfill unlikely to contain structural features because it lay in the line of King Street, and the fact that artifacts recovered from the fill were related only gratuitously to the ship. Any artifacts recovered in direct association with the hulk or artifacts which could help establish what archaeologists call termini post quem or ante quem-- markers of the dates after which or before which the ship could not have been deposited in the fill--were recorded as to provenience and saved.

Backhoe excavation began in the easternmost units and worked westward. Soil was removed in two-foot increments, with pauses for hand excavation of any features encountered. Backdirt was inspected as it came out for diagnostic artifacts, wood, or other indications of structural remains. At the conclusion of each two-foot level, the side walls of the trench were inspected, a quick profile drawn, and notes completed on soils and the nature of features appearing in the level. Once the hull was reached, however, excavation was carried out by hand, except when the backhoe was used to lift piled back dirt from the trench.

A Railroad Spur Line and the Surfacing of King Street

A number of features were encountered in the overburden superimposed above the ship remains. The first of these was a set of partially decomposed railroad ties, crossing the trench at a 15 degree angle. The ties were spaced from 10.75 to 12 inches apart, and in the 12'S, O'E unit segment of the trench (the easternmost unit explored), some were partially burned. They were surrounded by, and resting on, clean grey-brown sand in Unit 12'S, 16'S; but further south they were surrounded by a matrix of dark brown, sandy soil. One of the ties contained a railroad spike.

Reference to a 1906 map issued by Baldwin and Hall, which shows a portion of the waterfront in this area, reveals the presence of a railroad spur line which ran down King Street and then looped off in a sweeping curve to service the side of Pier 42 (see Map 4.09 below). Near the intersection of King and the Embarcadero, the spur crosses a corner of the odd-shaped lot formed by the irregular angle between the two. This wedge-shaped piece of property is traversed by the test trench, which at this point came down directly atop the remaining track bed (see Figure 4.33).

The spur line had earlier been disturbed by the installation of a former paved surfacing along King Street. Along the west property line of King Street, heavy granite curbstones were exposed, then removed. Their base was set at a depth of 29 inches below datus; they measured 16 inches in height and rose to within 13 inches of datum plane. Within several feet of this curb line, the railroad ties had been removed, apparently to facilitate its installation. To the north of the curb, i.e., within the confines of the street itself, the concrete base had been poured directly over the ties, encapsulating some of them (see Figure 4.34).

The structure of the street surfacing itself consisted of a roughly six-inch-thick layer of concrete containing a distinctive aggregate of blue-green schist. Atop this concrete bed was a surfacing of squared paving stones, set on edge lengthwise to form a seven-inch thick layer. Although a study of historical maps fails to indicate any time when King Street was paved along the block between First Street and the Embarcadero, this paving would seem to indicate that for some period, at least, such was the case. The paving stones suggest construction early in this century, perhaps for a brief period immediately after landfilling had been completed between Second Street and the Embarcadero. In later years the street became primarily a railroad right-of-way, a use still evidenced by the train cars sitting on nearby sidings (see Map 4.10).

The limited confines of the test trench prohibited a lateral exposure to trace the full extent of the surface, and hence it is impossible to say with complete assurance that it was indeed a former street surface. However, several facts suggest that King Street had formerly been paved. First is the presence of the heavy curbstones themselves. Second is the fact that they lie along the south property line of the street. Finally, 12 inches below the base of the concrete, running parallel to the curbstones and the street line, was a 12-inch diameter ceramic sewer line. No longer in use, this line had apparently been installed along King Street as part of the city system.

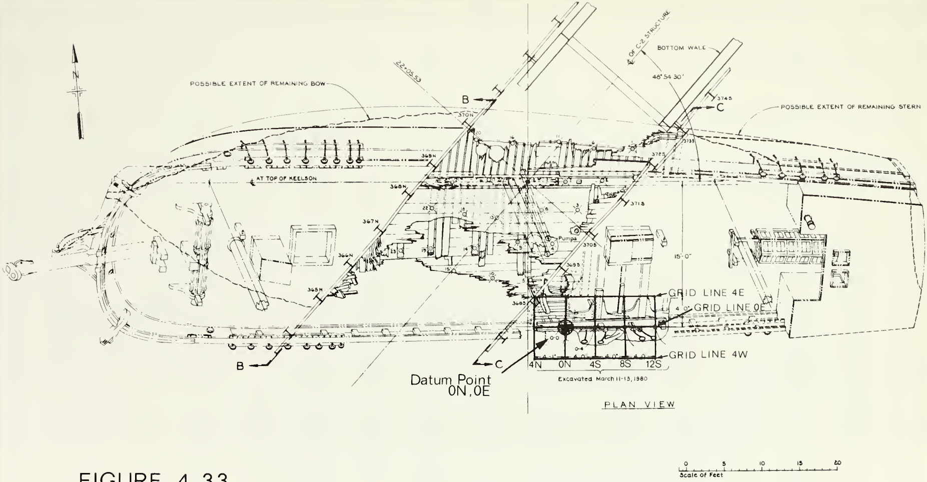
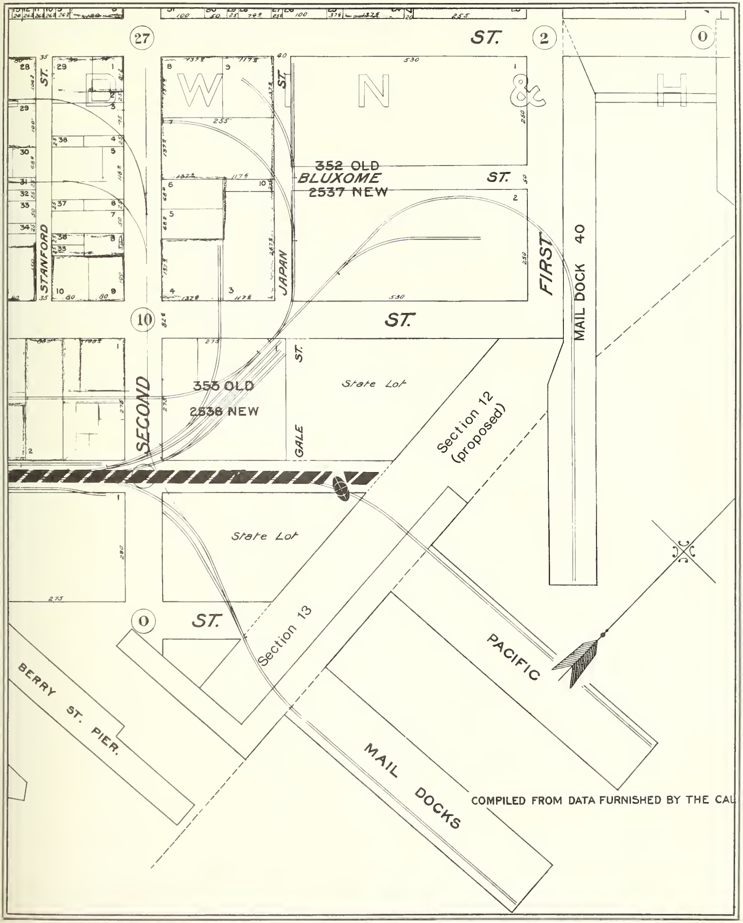


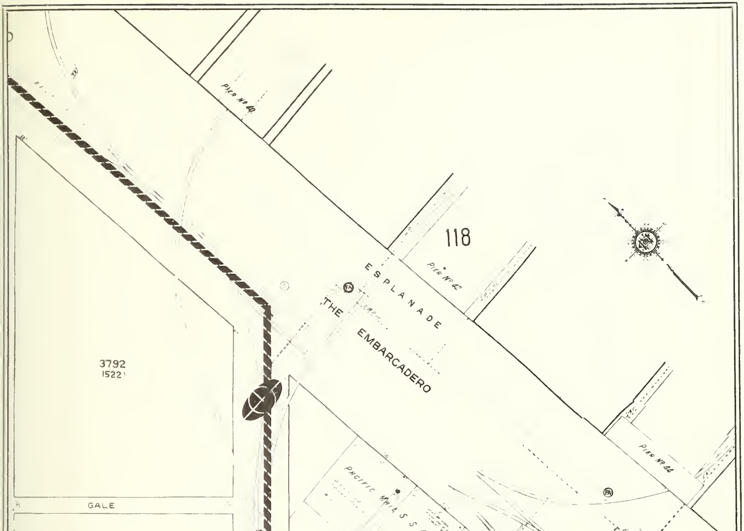
FIGURE 4.33

1980 SITE PLAN OF KING STREET SHIP

Figure 4.33: Site Plan of 1980 Archaeological Excavation. . .showing position of grid units and features. (Jack Prichett, Janice Narita Pastron, Raymond Aker)



Map 4.09: 1896 California Block Map. . .showing spur tracks leading to Pacific Mail Docks.



Map 4.10: Detail from 1919 Sanborn Map. . .showing King Street Ship site and completed seawall and Embarcadero.

As exposed in the sections of the trench south of the curbstone at the south line of King Street, the railroad tracks were laid directly on the ground. They were unsupported either on a bed of railroad gravel or a trestle framework. The location of the ties, as well as their angle with respect to the line of the trench and to King Street, corresponds closely with the line described by the 1906 Baldwin and Hall map. This fact poses a question with respect to the remains of the trestle structure noted in the sewer trench during the 1978 investigations.

Here we posit the following reconstruction. With the completion in 1905 of Section 13 of the seawall, a semi-lagoon was formed in the Pacific Mail Dock Basin, a lagoon which would soon become completely landlocked with the completion of Section 12. The 200 foot right-of-way of the Embarcadero was presumably brought to grade as part of the construction of Section 13, and the northern edge of this right-of-way lay less than 80 feet away from the still exposed hulk of the vessel lying in the center of the basin. The rail spur which we see running down King Street on the 1906 map (Map 4.09) would either have been supported on a trestle running above the lagoon or by pilings placed into recently laid-down fill as filling of the basin began.

These pilings were viewed during the 1978 exposure of the ship, immediately to the north of the hulk, as described earlier. They followed the line of King Street up to the point at which the vessel was discovered, but were not present in the sewer trench to the northeastern side of the hulk. During the 1980 excavation, which followed the line of the hulk rather than the line of the sewer trench, no pilings were encountered.

These archaeological observations suggested the following possible explanation: the "trestle" or piling support was employed beneath the track bed for the spur line along the distance between Second Street and the hulk. Once the line reached the location of the ship, the already present "platform" offered by the hulk formed a convenient stepping stone to the nearby lip of the Embarcadero right-of-way. Since the curve of the track necessary to reach Pier 42 carried it directly across the line of the hulk, it seemed possible that the ship served as the final portion of the "trestle" along King Street, with a specially deposited pad of fill bridging the remaining short gap between the Embarcadero and the ship itself. While this hypothesis arose as a possbility in the minds of the investigators following the 1980 excavations, it found additional support from information contained in a newspaper clipping discovered not long after the conclusion of the 1980 dig. Since this information was uncovered as part of the newspaper search conducted in the late spring of 1980, we leave discussion of the particulars for a later section of this paper devoted to the results of that archival search.

Below the Spur Track

Six inches to a foot beneath the concrete paving stone surface of King Street and the railroad ties appeared a distinctive band of dispersed railroad bed gravel. Too scattered to comprise a track bed, the gravel nonetheless formed a distinctive horizon in the excavation walls. Beneath this gravel lay approximately 12 inches of fine brown sand, laced with scattered pieces of the roadbed gravel. This shifted rapidly at 5 feet below City Base to a distinctive granular trash-laden layer of moist coarse sand, mixed with ash and rubble. Large amounts of oyster shell were present throughout the layer, which immediately overlay the ship remains. Broken window glass, fragments of brick, and wire and building materials all suggested that refuse dumping played a significant role in the formation of this layer. In the 1980 excavations, it was impossible to determine how far downward this layer extended, because the groundwater did not permit observation below a level of City Base minus 7.5 feet. This trash layer extended as far to the south as trenching was conducted.

The trash layer surrounding the ship apparently originated through a combination of landfilling, rubbish dumping, and tidal action within the partially enclosed Pacific Mail Dock Basin. In general, the bits of rubble and decomposing rock which comprised the main soil matrix were of a homogeneous 1/16 - 1/8 inch size, and the top of the layer appeared as a nearly straight line, clearly visible in the excavation wall profile. This would result from the constant agitation of tide and wave action, and in this respect, it must be noted that exploratory probes into the soil inside the hull of the ship disclosed that it was filled with a silty grey and devoid of artifacts. Evidence was found in the examination of the ship hulk itself that the deck had been purposely broken through in places. This damage was presumably the result of filling the below-decks cavity either in order to stabilize the hulk at a time when tide and wave action still affected her, or if accomplished when King Street was finally brought to grade, so as not to leave a large, unfilled concavity beneath a city street. In either case, it is evident that the filling of the vessel was independent from the deposition of the soil layer which surrounds her.

Only one indisputably dateable artifact emerged from the trash layer surrounding the ship. This was a soda water bottle fitted for a Hutchinson-type stopper, bearing in embossed letters a label reading "Hygeia Mineral Water." The Hygeia Company, operating out of quarters at 3270-24th Street in San Francisco, appears in Langley's **Business Directory** for the city only in the years 1902 and 1903. The bottle therefore provides a 1902 terminus ante quem (the date before which the fill could not have been deposited) for the fill material immediately surrounding the upper portions of the hull. Since the railroad spur line was in place by 1906, we can bracket the covering-over of the hull to the period between 1902 and the year of the great fire.

The work accomplished during three hectic days of exploration disclosed that the hulk of the King Street Ship was covered over sometime within a four year period. The fact that the topsides of the vessel were indeed intact, suspected from the inconclusive observations made in 1978, was confirmed. Enough additional information was gained concerning the vessel's size and construction to enable a reconstruction of her depth of hold and an estimation of her overall length and beam.

EXCAVATING AND RECORDING OBSERVATIONS ON THE SHIP

In the 1980 excavation, contact with the vessel was first made at a spot in Unit 4'S, O'E, at a depth of 78 inches below datum plane. Work with the backhoe was halted once timbers and large pieces of wood appeared to confirm that the ship had been reached. Subsequent clearing of the area by hand then revealed the presence of a large timber, several pieces of planking, and a lodge knee. Further exposure disclosed that these pieces were in a disturbed state. The timber appeared to be a deck beam, but the position in which it rested upon a lodge knee indicated that it had been partially displaced through the action of the backhoe. The planking, on the other hand, had clearly been disturbed at the time of our first encounter with it, with pieces lying at angles to each other and not being fastened to the deck beam. Did these two- and three-inch planks represent the deck planking, ripped up and shoved carelessly to the side when a hole was made in order to fill the vessel? Or could the planks be unrelated to the ship entirely, being wood debris tossed into the landfill in and over the ship? In either case, it was clear that contact with the vessel had been made inside the vessel's waterways (see Figure 4.14) and that the hull itself and the bulwarks, if they remained, lay further to the west. Clearing and exposing then began again, moving from the point of initial contact toward the west, with the intention of locating the ship's waterway, covering board, and bulwarks, as foreseen in the original excavation plan.

Four feet west of the initial contact, excavation soon exposed an iron ring. This was the eye of a chainplate, the point of attachment of the stays of the masts. Within minutes the rings of two more chainplates were uncovered. Since the top of the chainplates are always slightly higher than the tops of the bulwarks, the find suggested that the topsides of the vessel were probably intact. On the other hand, one of the chainplates was laid over to the west (see Figure 4.41), clearly having been wrenched out of place, presumably at the same time the deck had been stripped off. Locating the chainplates, which are attached to the outside hull, meant that the line of the hull was just inside them. The hull, the target of the excavation, had been found. A brief halt was called to consider the next step in excavation.

The top of the hull of a wooden sailing vessel is composed of several structural parts, and examination of these parts was the object of this exploratory excavation (see Figure 4.14). The heavy futtocks or timbers that form the "ribs" of the ship (in the case of the C-2 ship, already observed lower down during the 1978 operations) terminate at the deck level. Lying atop them and running the length of the vessel is a large, heavy board called the covering board. Into the covering board are set the bulwark stanchions, onto the outside of which is nailed light planking which forms a barrier to prevent items and sailors from falling or being washed overboard. The bulwarks are topped by a railing, varying in style with the expensiveness of the vessel. Beneath the covering board, with the deck planking butting against it, is a heavy, longitudinal timber called the waterway. Immediately below the waterway are set the ends of the deck beams, which span the hold of the ship and support the deck planking. These beams rest on hanging knees, large L-shaped support members, which in turn are firmly fastened to a heavy timber referred to as a beam shelf. On the outside of the hull, a short distance below the covering board, is found the channel, a heavy, half-foot-thick hull plank, which protrudes out a few inches from the outer hull planking. The "legs" of the chainplates pass over this piece, which holds them away from the bulwarks. This simplified schematic description of the upper hull and topsides structures catalogues the main features of the ship which were to be examined and recorded in the 1980 test excavation (see Figure 4.14).

Encountering the intact chainplate eyes raised expectations that much or all of the bulwark might be intact, and presumably the covering board and waterways below would also be in place. The top of the unbent chainplate lay 33.5 inches below datum plane. Assuming that it stood 3 to 3.5 feet above the covering board, it could be calculated that that board might appear at about the groundwater line at grid point 8'S, 0'E (see Figures 4.34 and 4.35). Since the vessel was known to lie at a distinct slope, it was anticipated that the area of the hull north of 4'S, 0'E would be above water and accessible to examination. This would provide the opportunity to expose at least a 12-foot length of the upper hull.

Anticipating these relationships, the excavation crew began to dig along the line of the chainplates, with the aim of reaching and exposing the covering board, waterways, and channel. At this point, time became a crucial factor. The excavation, originally planned to take two days at maximum, was now in the morning of that second day, and arrangements could be made only to permit a third day of work and no more.

Accordingly, a four-person excavation crew proceeded as rapidly as possible within acceptable standards of archaeological methodology. The crowded space in the bottom of the excavation site prohibited the participation of more than four workers, while slippery mud created by the groundwater coated the vessel, making working conditions treacherous (see Figure 4.36). A 1.5 horsepower "trash" pump brought in and used during the third day of excavation helped cope with the water incursion in the bottom of the trench, but except for being able to drain small areas around the end of the hose, the pump was inadequate. It did prove of value, however, for temporarily lowering the water level at a point where measurements were being taken (see Figure 4.37).

During the two days spent exposing the ship and recording data, work did not progress neatly from task to task. Excavation exposed particular structural features in one unit at the same time that workers measured and recorded ship parts in another. Diggers suddenly became measurers. Yet, perhaps because the research team had performed a similar excavation only weeks before on another ship and had worked together on this ship in 1978, a coherent and increasingly structured picture began to emerge concerning the nature of the vessel being exposed. This picture was built up both from new finds which emerged and from the patient piecing together of the new knowledge with what had been learned in 1978.

Locating Parts of the Ship

In what follows, the major elements of the hull and topsides, enumerated above, are discussed at some length because each revealed in its own way some part of the total story which has emerged concerning the ship found in King Street. While the discussion is couched in non-technical terms, measurements and some construction details may be consulted in the drawings in this volume (see Figures 4.39 and 4.42). Other more specialized

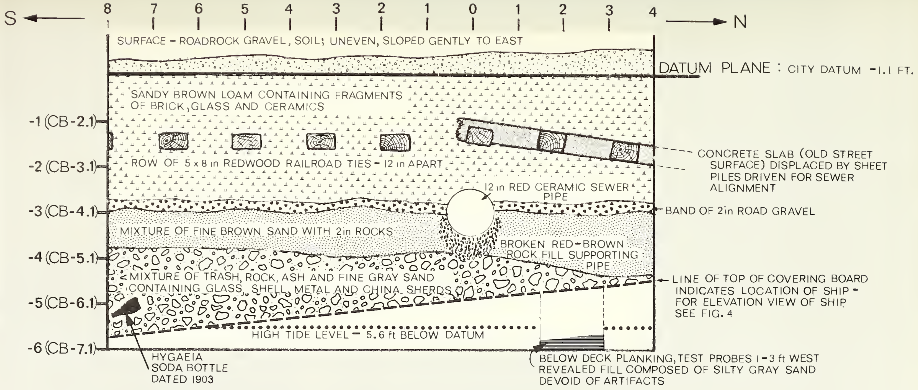

S
N
8
7
6
5
4
3
2
1
0
1
2
3
4
SURFACE - ROADROCK GRAVEL, SOIL; UNEVEN, SLOPED GENTLY TO EAST
DATUM PLANE : CITY DATUM -1.1 FT.
SANDY BROWN LOAM CONTAINING FRAGMENTS OF BRICK, GLASS AND CERAMICS
-1 (CB-2.1)
-2 (CB-3.1)
-3 (CB-4.1)
-4 (CB-5.1)
-5 (CB-6.1)
-6 (CB-7.1)
ROW OF 5 x 8 in REDWOOD RAILROAD TIES - 12 in APART
CONCRETE SLAB (OLD STREET SURFACE) DISPLACED BY SHEET PILES DRIVEN FOR SEWER ALIGNMENT
12 in RED CERAMIC SEWER PIPE
BAND OF 2in ROAD GRAVEL
MIXTURE OF FINE BROWN SAND WITH 2in ROCKS
BROKEN RED-BROWN ROCK FILL SUPPORTING PIPE
MIXTURE OF TRASH, ROCK, ASH AND FINE GRAY SAND CONTAINING GLASS, SHELL, METAL AND CHINA SHERDS
LINE OF TOP OF COVERING BOARD INDICATES LOCATION OF SHIP - FOR ELEVATION VIEW OF SHIP SEE FIG. 4
HIGH TIDE LEVEL - 5.6 ft BELOW DATUM
HYGAEIA SODA BOTTLE DATED 1903
BELOW DECK PLANKING, TEST PROBES 1-3 ft WEST REVEALED FILL COMPOSED OF SILTY GRAY SAND DEVOID OF ARTIFACTS

FIGURE 4.34

PROFILE OF ARCHAEOLOGICAL TEST EXCAVATION - 1980

Figure 4.34: Archaeological Profile, South Wall. . .of excavation units 4'N, O'E; O'N, O'E; and 4'S, O'E. Profile shows ground water level, position of covering board, and exposed stratigraphy. (Jack Prichett, Janice Narita Pastron)

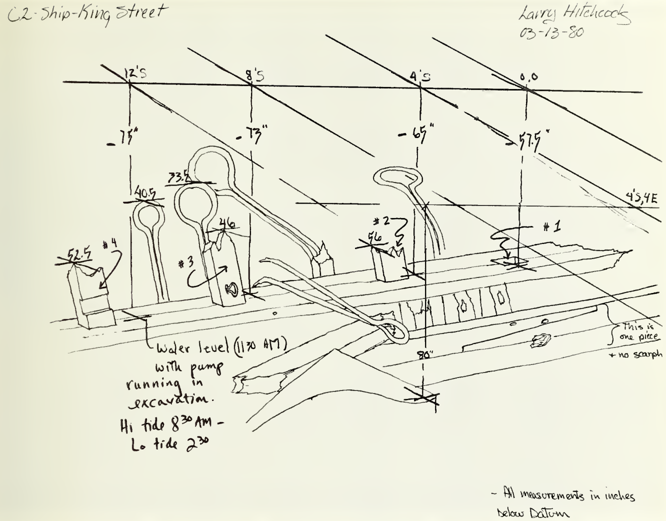


Figure 4.35: Perspective Sketch of Exposed Topsides. . .Larry Hitchcock's field notebook drawing records a view of structural and rigging details of the ship, as seen during the 1980 test excavation. Drawings such as these were coupled with numerous other measurements and observations into the final drawings compiled by Raymond Aker (see Figures 4.39 and 4.42).

Figure 4.36: Locating the Edge of the Hull. . .The chainplates, though their tops had been bent out of place, indicated where the covering board and hull must lie. When exposed, the covering board was found to be well preserved, although the stanchions and even some frames were rotted. (John Kortum)

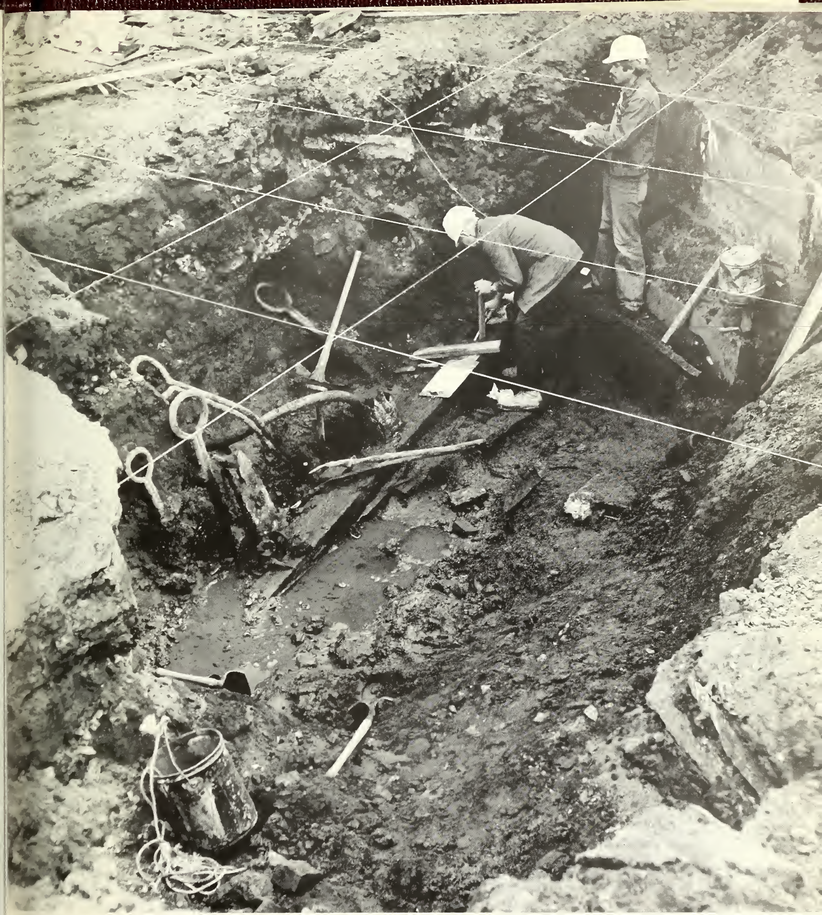


Figure 4.37: Test Excavation, March 1980. . .Raymond Aker and Jack Prichett (standing) take measurements of the covering board and chain plates exposed a few feet beneath the surface on the south side of the sewer. The concrete wall of the sewer box, built two years earlier, is seen behind Prichett. (John Kortum)

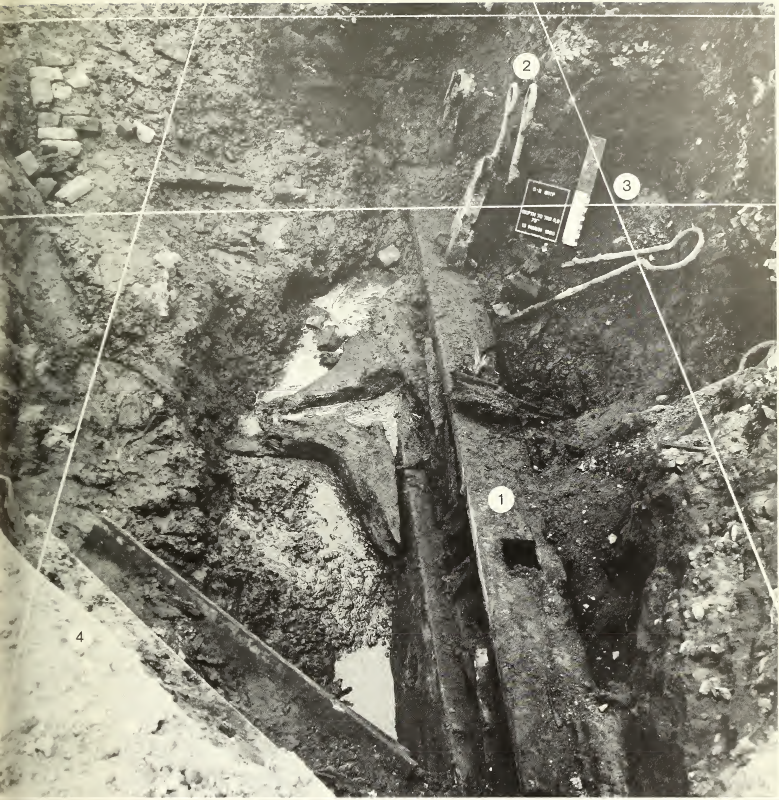


Figure 4.38: Lodging Knees Locate a Missing Beam. . . .Cleaned up as much as the quick and superficial excavation in 1980 ever would be, the covering board (1), stanchions, and chain plates (2) of the vessel are exposed almost exactly where they were expected to lie. The position of the knees lying in the mud indicated where a deck beam had been placed. Crossed grid strings (3) mark datum point O'N, O'E. Concrete wall of completed sewer structure, along line of King Street, is visible in foreground (4). (John Kortum)

publications are planned. Finally, the sequence in which parts of the ship are discussed does not reflect the order in which they are encountered or any estimation of their significance vis-a-vis each other. The order progesses, roughly speaking, from upper levels of excavation to lower, so that the chainplates are discussed before the stanchions, and these before the channel.

Chainplates: Along with being one of the first parts of the ship to come to light, the chainplates also yielded several crucial bits of evidence. It was immediately apparent from appearance and construction that they were not part of the original fittings of the King Street Ship. During the nineteenth century, chainplates were commonly composed of three separate pieces. Instead, however, the chainplates that appeared in the 1980 excavation were forged from a single length of steel (Figures 4.35 and 4.38). The chainplates served further to reinforce the impression--conveyed by the seemingly new wooden hull sheathing seen in 1978--that the ship had been refitted immediately prior to catching fire, may indeed even have been in the process of refitting at the time of the accident. The chainplates appeared--even after several decades of being buried--to be quite new. They bore no dents or scratches, nor were they pitted and corroded from long exposure.

Bulwarks: When maximum exposure of the covering board was achieved on the third day of the excavation, more than 12 feet of the covering board were visible. In this span, parts of three remaining bulwark stanchions and the holes for two more could be seen. Counted from south to north in the trench, these stanchions were numbered 1-5 for reference purposes (Figures 4.38, 4.39, and 4.35). Like the chainplates, the bulwarks provided a number of clues to the history of the ship in the period shortly before its demise.

The stanchions measured 5 inches by 8 inches, and they were spaced on 5-foot centers. Wood samples taken from each of the three were identified at the National Forest Products Laboratory in Madison, Wisconsin, as locust (Robinia spp.), of American origin. Locust was commonly used in the fabrication of stanchions.

Of the three partially preserved stanchions, the tallest of these, No. 3, was nearly complete (se Figure 4.40). Its head was seriously disintegrated, having the crumbly consistency of wet coffee grounds. Apart from the rot at the top, however, the stanchion was intact. Penetrating the top portion of the stanchion was a short iron rod, which had been driven in from above. Presumably the original function of this pin was to fasten the bulwark rail to the stanchion. The head of the pin protruded 1.5 inches from the stanchion; the distance from the head of the pin to the covering board was 28.27 inches through the stanchion. Assuming that the head of the pin was recessed 0.25 inch into the rail, it appears that the top of the rail was 29 inches higher than the covering board. Allowing for a 6- or 7-inch drop from the level of the covering board to the deck level, the bulwark rail stood some 3 feet higher than the deck.

Two other details noted in connection with the stanchions deserve particular mention. All three retained traces of white paint, with No. 4 appearing quite fresh when fully exposed (see Figure 4.40). The exterior bulwarks planking, generally made of one-inch board, was not present. Painting on the stanchions was limited to the inner three surfaces, with the outermost side (i.e., the side facing out to sea, which would have been covered by the bulwarks planking) unpainted. This fact suggests that the bulwarks planking had recently been stripped off, presumably for the purpose of replacement, an interpretation which adds support to the notion that the vessel was in the process of being refitted when she caught fire.

The second detail associated with the stanchions involved ship fittings and hardware. Screwed into Stanchion No. 4, some 1.5 inches above the covering board, was a heavy, 3-inch steel ring. Considering the position of this stanchion with respect to the main mast (see Figure 4.39), it is probable that this ring was used to secure the top gallant halyard (Ray Aker, personal communication). Immediately above this ring, an imprint, visible in the wood, was left by a piece of hardware which had been fastened there and later removed. Measuring 3.25 inches square, it is likely that the impression is from a cleat which was fastened there.

Covering Board and Waterway: The covering board, still in a good state of preservation, was identified as a member of the yellow pine group (Pinus app.), and of American origin (National Forest Product Laboratory, personal communication). The section observed consisted of a single, unjoined piece, which still bore some white paint in Unit 4'5,0'E (see Figures 4.35 and 4.39). Immediately inboard of the covering board, however, the waterway was found to be nearly completely rotted out (see Figure 4.41), with only enough fragmentary pieces remaining to reconstruct its original shape, as shown in the drawing (Figure 4.39). A wood sample from the waterway remnants submitted to the National Forest Products Laboratory was identified as white pine (probably Pinus strobus) of an eastern United States origin.

In Unit O'N, O'E, the absence of the rotted-away waterway had displaced the orginally horizontal covering board, inclining it downward toward the deck horizontal at an angle of 13 degrees. The missing waterway exposed the tops of the frames (i.e., the "ribs" of the ship) and a large beam running the length of the ship, which formed the shelf on which the end of the deck beams rested (Figure 4.41). The exposed shelf beam was notched where the deck beam rested, thus seating it firmly. Further to the south, the waterway was in better condition, and as a result, the covering board may still be in its original position in the more eastern, unexamined stern sections of the ship.

At the conclusion of the excavation when it was time to backfill over the ship, it was realized that the now-open space where the waterway had been might result in further depression and possible breakage of the unsupported covering board. To protect against this, bricks were placed in the space between the shelf beam and the covering board to provide support to the latter.

Visible below the waterway and covering board were lodge knees and a deck beam. These were located approximately in the center of Unit 4'S, O'E (see Figure 4.38). The original deck planking having been removed, these structural members were partially visible once exposure of the vessel began, being obscured only by the disordered planks lying atop them (discussed above). The lodge knees and deck beam had been moved slightly by contact with the backhoe bucket, but their original position was easily determined by the fact that a notched seat for the end of the deck beam had been cut into the deck beam shelf. The two displaced lodge knees were removed, recorded as to provenience, affixed with a permanent labeling tag, and placed in storage as a complement to ship parts removed from the C-2 trench during 1978. A single hanging knee supporting the deck beam was also recorded and removed (see Figure 4.39). During 1978, it will be recalled, hanging knees had been observed in the upper portion of the ship visible along the south wall of the sewer trench, and it was their presence which suggested that the deck, waterways, and perhaps even bulwark sections of the vessel might be intact on the west (what we now know to be the port) side (see Figures 4.12, 4.18 and 4.39).

Examining the Exterior of the Hull

A small portion of the exterior of the upper hull was also fully examined between stanchions No. 2 and 3 in Unit 4'S, O'E. This point was chosen since it was the location of the westernmost (hence highest above groundwater level) of the visible chainplates (see Figures 4.33 and 4.38). The objective of the exposure was to determine the size and placement of the channel and, if possible, to reach the lower end of the chainplate. This examination proved difficult, because it could not be undertaken until the afternoon of the third day, a time when the tide was high and groundwater in the trench stood to the bottom of the covering board at the point to be excavated. Much of what was recorded was, therefore, felt rather than actually seen, and measured underwater.

The channel, whose top lay 1.25 inches below the bottom of the covering board, was readily located. Its total thickness (i.e., its vertical dimension) was 5.38 inches, while it protruded 5 inches beyond the hull planks. A 2-inch wooden clamp attached to the outer surface of the channel served to hold the chainplates in place where they crossed over the channel. Thus the channel, together with this clamp, extended 7 inches beyond the topside planking. On the outside of the hull, the bottom of the chainplate could not be located, but inside the hull, on the morning of the third day when groundwater was low, a clinched-over bolt was visible which corresponded to the end of the chainplate.

A Key Discovery

While investigating the exterior of the ship's hull, maritime consultant Aker encountered a structural detail, small and seemingly insignificant at the moment, which proved to be of major significance in identifying the nature of the vessel. This was a small wooden block measuring four inches by five, the "heel" of a boat support stanchion, bearing the remains of an iron U-bold which was secured into the covering board. In turn, the stanchion support was supported by a second small wooden block resting on the channel (see Figure 4.39, note 8). Only on a whaler, which carried four or five 30-foot whale boats ready for instant launching, would one expect to find such stanchions. In a photograph of the whaling ship **Lydia** (see Figure 4.59 below), boats mounted in this position on the stanchions are visible.

The suggestive evidence that the anonymous King Street Ship might be a whaling vessel gave rise to optimism. While whalers registered in San Francisco during the last third of the nineteenth century might number in the dozens, the scope of the investigation necessary to track down the identity of the ship would, nonetheless, be greatly reduced.

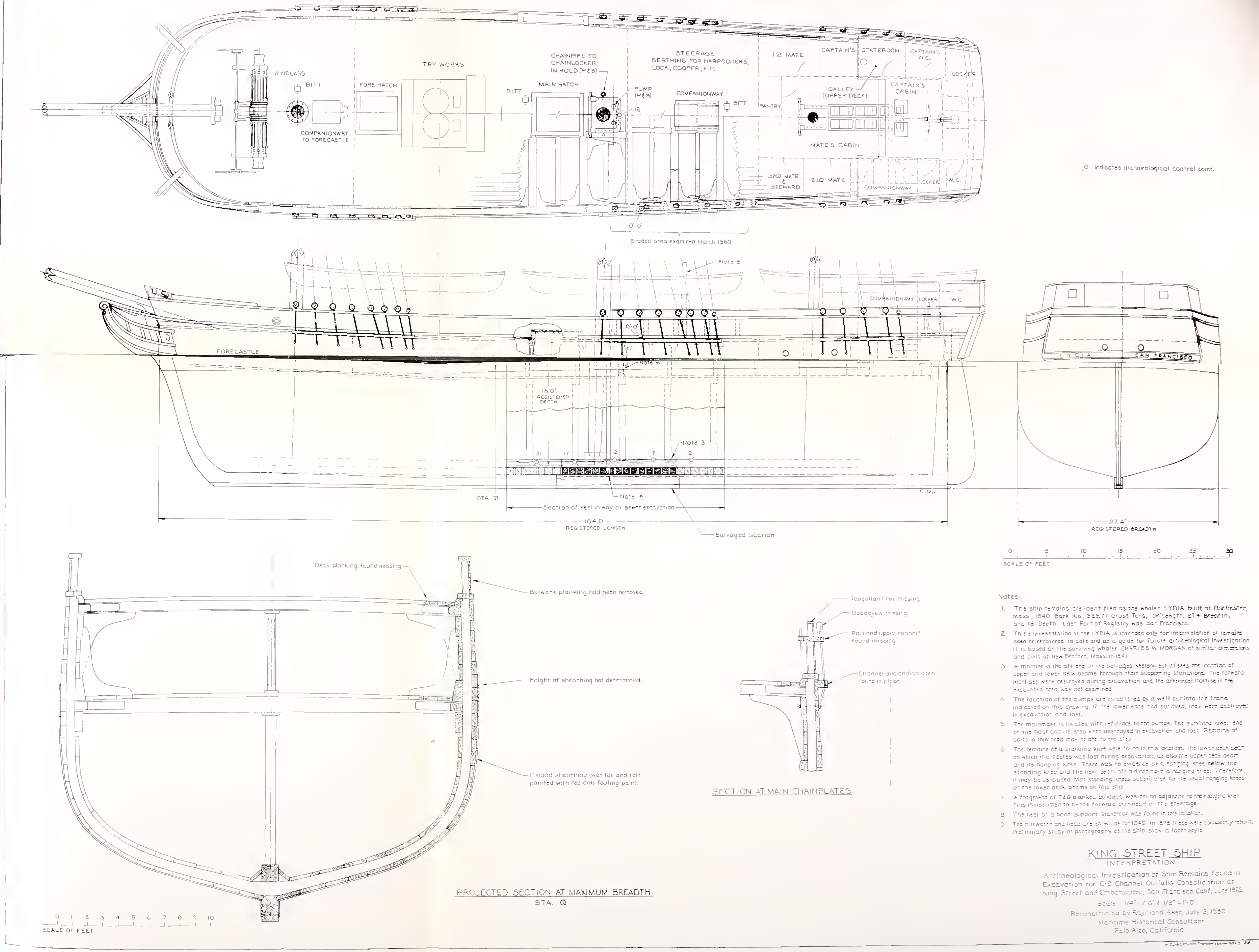
In light of the whaler hypothesis, other details recorded during the excavation took on added significance. The deck beam and lodge knees, for instance, noted in Unit 4'S, O'E, had been painted white on the underside. While this detail had been noted as unusual, no particular significance had been attached to it. On whalers, however, the steerage served as the harpooners' quarters, rather than hold space, as on other classes of vessel. While the interior of a cargo hold would not commonly be painted, space used for crew's quarters would be to make them more pleasant. This interpretation of the painted beam and knees was bolstered by the presence of a copper nail which had been partially driven into one of the lodge knees. The knee directly below the deck apparently offered a convenient place for a nail from which to hang a seaman's jacket or bag.

Concluding the Excavation

Of the three days spent on the test excavation, the first day was devoted to recording features in the overburden covering the ship and, once contact had been made, to shoveling by hand in order to locate and identify the portions of the vessel falling within the test units. The initial clearing, which had exposed several chainplates in Units 4'S, O'E and 8'S, O'E and part of the covering board and disturbed planking at about the deck level in Unit O'N, O'E, had been accomplished. Thus, by the end of the first day, several of the features which had been the target of excavation had been located. The second day of work, and much of the third, were devoted to hand-clearing of the ship parts, measurement and data recording, and consultation of the 1978 data in an attempt to arrive at a comprehensive profile of the west side of the hull and to fit together disparate observations.

By late afternoon of the third day, it was time to rebury the exposed section of the vessel. As noted earlier, support was placed beneath the covering board to allay damage to it. Fragile, unsupported parts of the topside, such as the stanchions, were covered by hand-shoveling. Once a protective pad of backfill had been placed over the hulk, the loader scoop of a small backhoe was used to completely fill the test trench. Care was taken to avoid the dumping of heavy, potentially damaging rubble, such as the paving blocks and concrete surfacing of King Street, in the deeper levels nearer the ship. Using the backhoe, the backfilling operation was concluded in two hours.

The test excavation had succeeded in its objectives. The ship had been studied and observations confirmed what the 1978 work had only suggested: that the portions of the hull lying to the south of the C-2 sewer alignment were essentially intact, up to and including parts of the bulwarks. Data suggesting that the ship may have been a whaler had come to light, and a complete hull profile drawing could now be assembled to give an accurate picture of the vessel's overall dimensions. While work had per force moved at a very rapid pace, the major questions requiring data from excavation had been answered. The quest for the vessel's identity still remained, but it was significantly narrowed in its scope. The size of the ship was known, and there were some indications that the ship in King Street was a whaling vessel.


WINDLASS
BITT
COMPANIONWAY TO FORECASTLE
TRY WORKS
FORE HATCH
BITT
MAIN HATCH
CHAINPIPE TO CHAINLOCKER IN HOLD (P & S)
PUMP (P & S)
12
COMPANIONWAY
BITT
STEERAGE BERTHING FOR HARPOONERS, COOK, COOPER, ETC.
1st MATE
CAPTAIN'S STATEROOM
CAPTAIN'S W.C.
LOCKER
PANTRY
GALLEY (UPPER DECK)
CAPTAIN'S CABIN
MATE'S CABIN
3RD MATE & STEWARD
2ND MATE
COMPANIONWAY
LOCKER
W.C.
0'-0'
Shaded area examined March 1980
○ Indicates archaeological control point.
Note 8
COMPANIONWAY
LOCKER
W.C.
0'-0'
FORECASTLE
Note 6
18.0' REGISTERED DEPTH
Note 3
21
17
12
7
2
Note 4
STA ⑪
Section of keel in way of sewer excavation
104.0' REGISTERED LENGTH
Salvaged section
LYDIA
SAN FRANCISCO
27.4' REGISTERED BREADTH
0
5
10
15
20
25
30
SCALE OF FEET
Deck planking found missing
Bulwark planking had been removed.
Height of sheathing not determined.
1" wood sheathing over tar and felt painted with red anti-fouling paint.
PROJECTED SECTION AT MAXIMUM BREADTH
STA. ⑩
0
1
2
3
4
5
6
7
8
9
10
SCALE OF FEET
Topgallant rail missing
Deadeyes missing
Rail and upper channel found missing
Channel and chainplates found in place
SECTION AT MAIN CHAINPLATES

Notes:

1. The ship remains are identified as the whaler LYDIA built at Rochester, Mass., 1840, Bark Rig, 329.77 Gross Tons, 104' Length, 27.4' Breadth, and 18' Depth. Last Port of Registry was San Francisco.
2. This representation of the LYDIA is intended only for interpretation of remains seen or recovered to date and as a guide for future archaeological investigation. It is based on the surviving whaler CHARLES W. MORGAN of similar dimensions and built at New Bedford, Mass. in 1841.
3. A mortise in the aft end of the salvaged keelson establishes the location of upper and lower deck beams through their supporting stanchions. The forward mortises were destroyed during excavation and the aftermost mortise in the excavated area was not examined.
4. The location of the pumps are established by a well cut into the frame indicated on this drawing. If the lower ends had survived, they were destroyed in excavation and lost.
5. The mainmast is located with reference to the pumps. The surviving lower end of the mast and its step were destroyed in excavation and lost. Remains of bolts in this area may relate to the step.
6. The remains of a standing knee were found in this location. The lower deck beam to which it attaches was lost during excavation, as also the upper deck beam and its hanging knee. There was no evidence of a hanging knee below the standing knee and the next beam aft did not have a hanging knee. Therefore, it may be concluded that standing knees substituted for the usual hanging knees on the lower deck beams on this ship.
7. A fragment of T&G planked bulkhead was found adjacent to the hanging knee. This is assumed to be the forward bulkhead of the steerage.
8. The heel of a boat support stanchion was found in this location.
9. The cutwater and head are shown as for 1840. In 1878 these were completely rebuilt. Preliminary study of photographs of the ship show a later style.

KING STREET SHIP
INTERPRETATION

Archaeological Investigation of Ship Remains Found in Excavation for C-2 Channel Outfalls Consolidation at King Street and Embarcadero, San Francisco, Calif., June 1978.

Scale: 1/4" = 1'-0" & 1/2" = 1'-0"

Reconstructed by Raymond Aker, July 5, 1980
Maritime Historical Consultant
Palo Alto, California

Figure 4.39: **Interpretive Reconstruction of the Whaler Lydia.** . .based on archaeological findings and on dimensions of a similar vessel, the **Charles W. Morgan.** (Raymond Aker)

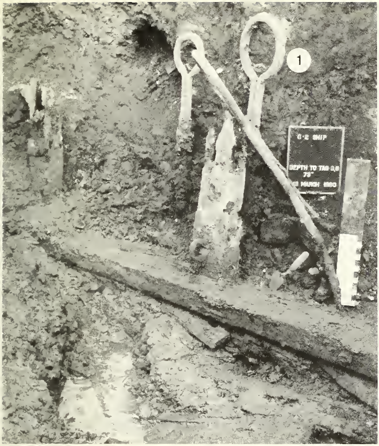
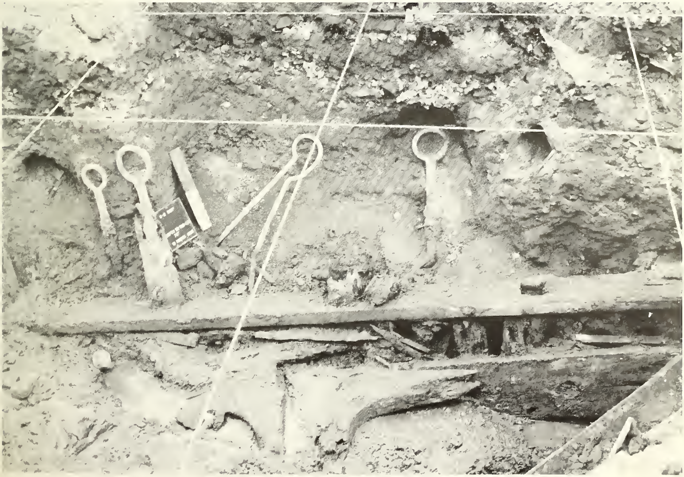
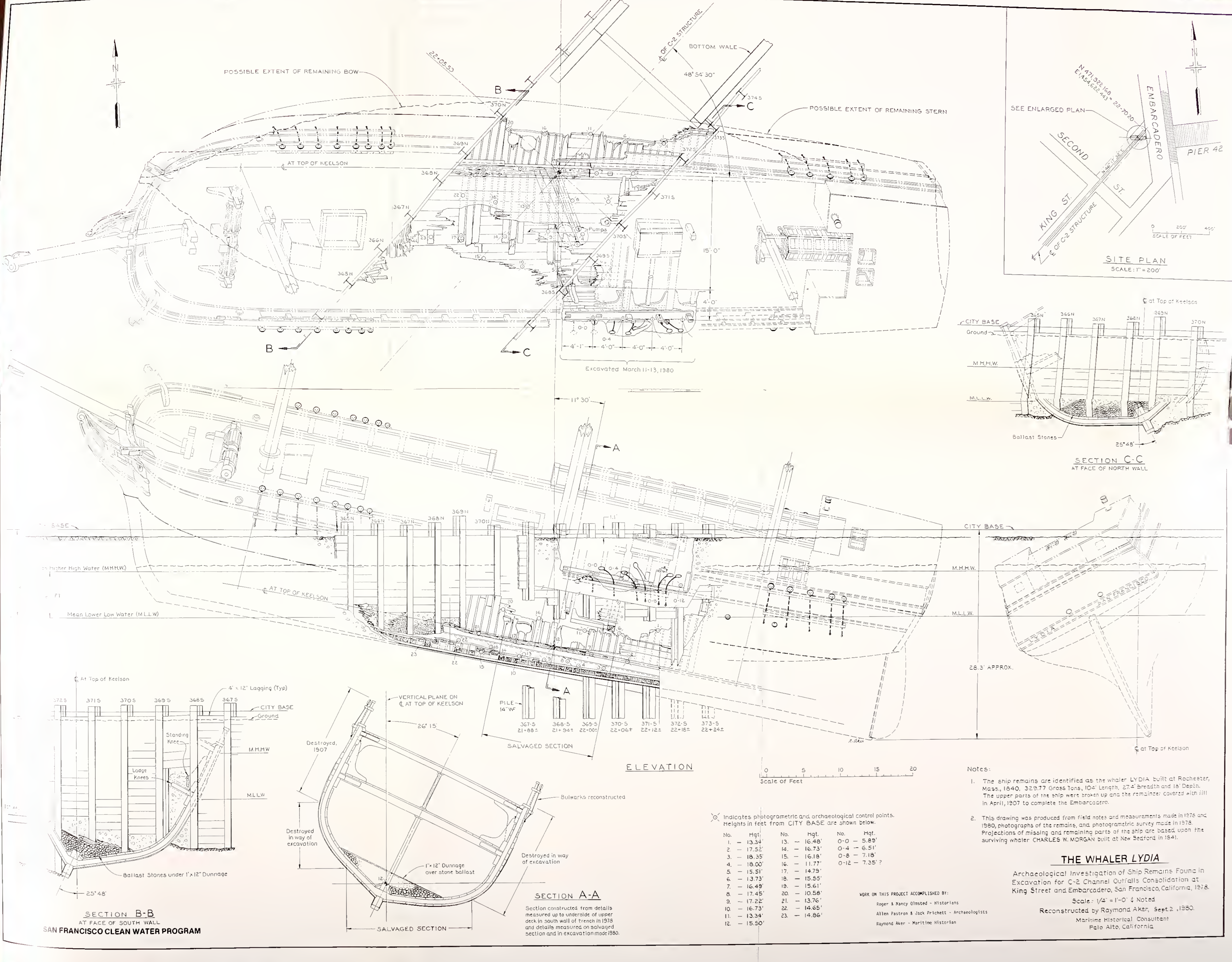


Figure 4.40: Remarkable Preservation of Detail. . .observed during the test excavation suggests that the stern portions of the vessel, still buried, may be in excellent condition. The tallest remaining stanchion still possessed a bright coast of white paint. The large ring just above covering board (1) probably secured the top gallant halyard stay. (John Kortum)

Figure 4.41: A Twelve-Foot Length of the Covering Board. . .was exposed by the conclusion of the exploratory excavation. Rotted timber heads showed beneath the covering board where the waterway had been broken. This photo, showing the maximum depth of observation achieved (some seven feet below ground suface), was taken two hours after low tide when groundwater in the bayside site had subsided to the maximum degree. Constant incursion of water posed a major hindrance to the excavation. (John Kortum)





Section constructed from details measured up to underside of upper deck in south wall of trench in 1978 and details measured on salvaged section and in excavation made 1980.

⊙ Indicates photogrametric and archaeological control points. Heights in feet from CITY BASE are shown below.

No.	Hgt.	No.	Hgt.	No.	Hgt.
1.	— 13.34'	13.	— 16.48'	0-0	— 5.89'
2.	— 17.52'	14.	— 16.73'	0-4	— 6.51'
3.	— 18.35'	15.	— 16.18'	0-8	— 7.18'
4.	— 18.00'	16.	— 11.77'	0-12	— 7.35' ?
5.	— 15.51'	17.	— 14.79'		
6.	— 13.73'	18.	— 15.55'		
7.	— 16.49'	19.	— 15.61'		
8.	— 17.45'	20.	— 10.58'		
9.	— 17.22'	21.	— 13.76'		
10.	— 16.73'	22.	— 14.65'		
11.	— 13.34'	23.	— 14.86'		
12.	— 15.50'				

WORK ON THIS PROJECT ACCOMPLISHED BY:

Roger & Nancy Olmsted - Historians
Allen Pastron & Jack Prichett - Archaeologists
Raymond Aker - Maritime Historian

Notes:

1. The ship remains are identified as the whaler LYDIA built at Rochester, Mass., 1840, 329.77 Gross Tons, 104' Length, 27.4' Breadth and 18' Depth. The upper parts of the ship were broken up and the remainder covered with fill in April, 1907 to complete the Embarcadero.
2. This drawing was produced from field notes and measurements made in 1978 and 1980, photographs of the remains, and photogrametric survey made in 1978. Projections of missing and remaining parts of the ship are based upon the surviving whaler CHARLES W. MORGAN built at New Bedford in 1841.

THE WHALER *LYDIA*

Archaeological Investigation of Ship Remains Found in
Excavation for C-2 Channel Outfalls Consolidation at
King Street and Embarcadero, San Francisco, California, 1978.

Scale: 1/4" = 1'-0" & Noted

Reconstructed by Raymond Aker, Sept. 2, 1980.

Maritime Historical Consultant
Palo Alto, California

SAN FRANCISCO CLEAN WATER PROGRAM

Figure 4.42: Projected Views of Whaler Lydia. . .as viewed in situ during archaeological investigations of 1978 and 1980. (Raymond Aker)

TABLE 4.01

RECORD OF VOYAGES OF THE WHALER LYDIA

						RETURNS		
	Voyage Dates 1840 - 1897	Home Port	Master	Managing Owner/ Agent	Whaling Ground	Barrels Sperm	Barrels Whale	Pounds Bone
1840	9/2/40 - 2/17/45	Nantucket	Geo. Cathcart	James Athearn	Pacific	1225	-	-
1845	5/8/45 - 4/25/48	Fairhaven	Capt. Robinson	Sheffield Reed	Pacific	500	1900	4000
1848	8/16/48 - 7/1/51	Fairhaven	H.F. Worth	Sheffield Reed	Pacific & N.W.	875	1190	18800
1851	11/9/51 - 3/12/54	Fairhaven	H. F. Worth	F. R. Whitwell	N. Pacific	-	2463	46400
1854	10/14/54 - 5/21/58	Fairhaven	J. W. Leonard	F. R. Whitwell	N. Pacific	119	729	4800
1860	5/16/60 - 5/17/64	Fairhaven	E. Babcock	Jenney & Tripp	Pacific	1052	709	600
1864	8/18/64 - 5/17/65	N. London	A. Turner	Lawrence & Co.	Hurd's Island	-	1734	-
1865	11/2/65 - 5/1/69	N. Bedford	T. B. Hathaway	Edmund Maxfield	N. Pacific	33	1270	16898
1869	7/14/68 - 8/1/73	N. Bedford	L. W. Gifford	Edmund Maxfield	Pacific	288	1163	1638
1874	6/18/74 - 10/24/77	N. Bedford	John P. Praro	Baylies & Cannon	Pacific	1380	-	-
1878	4/16/78 - 10/21/80	N. Bedford	A. J. Cory	William Baylies	Pacific	965	-	-
1880	11/23/80 - 8/26/84	N. Bedford	E. M. Frazier	William Baylies	Atlantic	890	335	2000
1884	10/21/84 - 11/6/87	N. Bedford	E. J. Smith	William Baylies	Pacific	-	-	
1885	11/11/85 - 11/12/86	San Fran.	E. J. Smith	William Baylies	N. Pacific	-	475	4500
1886	12/9/86 - 11/6/87	San Fran.	T. J. McLane	William Baylies	N. Pacific	-	800	8000
1887	11/22/87 - 11/7/88	San Fran.	T. J. McLane	William Baylies	N. Pacific	-	550	5500
1888	11/24/88 - 10/31/89	San Fran.	R. D. Cleveland	William Baylies	N. Pacific	-	700	10000
1889	12/3/89 - 11/5/90	San Fran.	J. H. Knowles	Wright & Bowne	Japan & Okhotsk Sea	70	600	6000
1891	3/9/91 - 10/29/91	San Fran.	J. H. Knowles	Wright & Bowne	N. Pacific	-	600	6000
1891	12/1/91 - 9/17/92	San Fran.	P. O. Montgomery	Wright & Bowne	N. Pacific	-	180	3000
1895	3/19/95 - 11/8/95	San Fran.	W. F. Macomber	Wright & Bowne	N. Pacific	-	80	1000
1896	3/11/96 - 11/19/96	San Fran.	G. W. Jenks	Wright & Bowne	N. Pacific	-	85	1500
1897	2/22/97 - 10/24/97	San Fran.	G. W. Jenks	Joseph Knowland	N. Pacific	-	300	4500

NOTES:

1845 - After first voyage from Nantucket, sold to Fairhaven.

1851 - Whalebone catch (at low of $.395/lb.) brought $18,328; whale oil realized $46,259 for a total $64,587 (figures from Starbuck).

1864 - Sold to New London and re-rigged as bark; listed "bark-rigged" through 1901.

1878 - Overhauled, according to an insurance survey:

"4 new strakes of wales on both sides and 15 new timbers aft on each side, taking of wales and plank to put them in. Put new plank forward on both sides from stem to fore chains (say from 6 to 8 strakes on each side), new breastwork forward in the hold. Re-treenailed from keel up to her gunwale on both sides, some 5000 in all, through and through and wedged on both ends. Above the waist 6 new strakes all round and new planksheer all round. Newly bulwarks forward outside. New knightheads, new rail forward, new cathead, some new stanchions and new waterways, new corner counter timbers, new stern inside and new taffrail, new cutwater and head and everything attached. New caulked all over bottom, cemented, sheathed and coppered. New mainmast and mizzenmast. Thoroughly overhauled, timbers exposed all round from the wales of her deck to the chainbolt strake and found sound with the exception of those replaced with new, as stated above. I consider her a sound and staunch vessel, in thorough order throughout and worthy of the confidence of underwriter" (courtesy Old Dartmouth Historical Society Whaling Museum Collections).

1884 - After bringing home nothing from the Pacific, transferred to San Francisco.

1888 - 10,000 lbs. of whalebone brought home $35,000($3.50/lb.) and 7000 barrels whale oil brought $8,820, for total of $43,820 on North Pacific cruise lasting only from November 24, 1888, to October 31, 1889 (figures from Bockstoce).

1897 - Owned by Joseph Knowland on last San Francisco whaling cruise. Escaped very serious ice conditions by going to Okhotsk Sea, but endured heavy winds, suffered damage, and lost sails. Yield from 6-month voyage considerably more than value of **Lydia** herself: $2,835 in oil plus $15,750 in whale bone (at $3.50/lb.) for total of $18,585 (figures from Bockstoce).

first voyage from Nantucket, sold to Fairhaven.

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TRACING THE DAILY PRESS FOR THE SHIP'S DEMISE

The second excavation of the King Street Ship led directly to the second newspaper search for information on the demise of the vessel, an event presumed to have occurred as she was being refitted with new chain plates and new hull sheathing for some further service. The fill overlying the vessel, as had become clear during the 1980 excavation, was comprised of a lower bed (beneath the level of the cobblestone street surfacing and the railroad track bed) which dated to the first few years of the twentieth century when the area behind Section 13 of the seawall was backfilled, and an upper level (above the street surfacing) which post-dated the 1906 earthquake and fire period. Furthermore, it was now the expert opinion that we were looking for a particular class of vessel: an East Coast vessel built perhaps in the 1850s or earlier, probably a whaler, perhaps a sealer, or possibly a government vessel.

This information meant that a newspaper search could be made on two levels: (1) a search for the identity of the "old____" that burned atthe foot of King Street, and (2) a deliberate accumulation of little known valuable data on the history of whaling on the Pacific Coast, as well as the kinds of old vessels that were being brought out from the mud flats of Oakland Creek (the Oakland Estuary), Islais Creek, and Mission Bay and being refitted for some extended or different type of service.

The question was now one of narrowing the time span of the newspaper search to something that could be accomplished within a relatively small budget without overlooking the possible times and means of the beaching of the ship. The Harbor Commission Map of 1896 shows the beach at the foot of Second Street still accessible, but the dates of the projected seawall sections seemed to be the more relevant factors. Figure 4.43 shows Section 12 of the seawall as "proposed on May 1, 1907." Note that Section 13--more crucial to the positioning of this vessel--was already built. Therefore, although theoretically the vessel could have been pulled away from a burning dock and beached in the cove after Section 13 was completed, it would seem less likely. Gerald Dow (working from the Harbor Commission Reports) listed the construction dates of Section 13 of the seawall as starting December 30, 1903, and completed on April 27, 1905 (Dow 1973:143).

If the dates are correct in terms of the final completion of the seawall's physical construction, i.e., the bulkhead was in and some fill had been introducted on top of the King Street Ship, then the newspaper search should start in about 1903 and go through April of 1905. As newspapers in San Francisco were almost as bulky in this period as they are today and as the newsprint has been placed on microfilm to conserve library space, this meant a tedious search, covering roughly 15,680 pages of newspaper on film.

A Chronology of Decision Affecting the Building of the Seawall

The first mention in the **San Francisco Examiner** of the projected seawall construction appeared with the headline on October 8, 1903:

> **New Seawall Will Change the Line of the Waterfront**
>
> The entire contour of San Francisco's waterfront will change by the first step taken by the Harbor Commission when it opened bids for the building of a section of 600 feet of seawall. . . . The commission did not award the contract at today's meeting as the law requires that either the Mayor or the Governor be present to give his consent to changing the seawall. . . The new seawall is to be commenced at Channel Street and extend to the Harrison Street wharf. The Atlantic, Gulf and Pacific Company will build the first section, which will extend 600 feet north. When the proposed seawall is completed, East Street will be continued around the waterfront, then the filled-in land will be utilized to build State blocks on. The seawall will run in a northeasterly direction and will permit the building of fourteen wharves where there are now only nine. It is the intention of the Harbor Commission to construct modern cylinder pier wharves, the first to be for the use of the Pacific Mail Company.

The present-day seawall around the waterfront, from Fishermen's Wharf to China Basin, was begun with equivalent enthusiasm in 1878 at the north end of the city front. The construction of the seawall and new Ferry Building at the Foot of Market in 1896-98 was the high point in the long work. When the time had come, after the turn of the century, to undertake the reconstruction of the southern waterfront, the State Board of Harbor Commissioners leapfrogged to the Pacific Mail Basin. Officially, construction of Section 13 of the new seawall, between King Street and a point south of Berry Street, began December 30, 1903, and the 600-foot section was completed on April 28, 1905. As in the case of the previous construction, the 150-foot-wide area of fill forming most of the Embarcadero, not just the 50-foot-wide rock embankment on the bayside face, was not part of the seawall.

Section 13 was designed to provide two new piers for the Pacific Mail Steamship Company (Piers 42 and 44). As Map 4.07 shows, the construction of Section 13 required removal of the Central Pacific car ferry slip, but did not interfere with continued use of the old Pacific Mail Dock. Section 12, begun on June 13, 1907, required demolition of the dock, but by that time the new piers were in service.

The reason for taking a closer look at the chronology of the seawall construction is that this period of change, when the face of the old Pacific Mail Basin was being altered but when access to the basin and beach behind the projected seawall was still possible, would appear the likeliest time at which the vessel was sunk there. Again, there was some point at which the possibility of introducing a ship into that location became impossible. Questions arise, then, as to when physical work actually began on Section 12, what the progress was, and when the backfill was completed. The western toe of this fill extends as far as the ship, as was discovered in the test excavation of 1980. However, this factor was not known to us earlier, and hence the possibility the vessel had somehow got in there after the completion of Section 12, but before Section 13 absolutely shut off access, had to be considered. Indeed, uncertainty as to whether or not the Embarcadero fill for Section 12 was promptly carried out after the construction of the rock seawall proved troubling. The progress of the seawall on the southern waterfront, and the building of the new piers there, is spectcularly well documented with photographic panoramas made for Healey-Tibbetts (a party to most of the work)--but not in the case of Section 12 and Piers 42 and 44. Perhaps the 1903-1906 photographs, if made, were lost in the great fire.

One of the fine Healey-Tibbetts views showing the transformation of the Pacific Mail Basin area, immediately adjacent to the King Street Ship site, is seen in Figure 4.44. Across the center of the picture, Section

12 of the seawall, built in 1907 and 1908, has finally cut off the old Pacific Mail Dock and sealed in the basin for filling. At the right, Healey-Tibbitts is constructing the new Pier 40, seen in the shadow outline of the "seawall and pier improvements" projected in the Map of October, 1906 (see Map 4.07). Directly beyond the decking of Pier 40 and the new bulkhead wharf atop the seawall, one sees the cut-off shed of the old Pacific Mail Dock. To the left, in the center of the photograph is the blank brick wall of the Oriental Warehouse. In front of the Oriental Warehouse are the peaked roofs of the frame Occidental Warehouse extending to the line of Townsend Street. The three shallow doors in the side of the Occidental Warehouse make the building appear to have sunk into the earth. Actually, it was the other way around: the wharf level at the Occidental Warehouse had been several feet below city grade, and the filling of the basin has partially buried the warehouse.

Just beyond the frame of the crane barge in the foreground, behind the fence, a dump cart is adding to the accumulated rubbish found in the fill of this area. This water lot, at the left of the photograph, is the one on the north side of King Street, at the Embarcadero. The location of the King Street Ship is, maddeningly, just out of sight to the far left.

Another Healey-Tibbetts photograph, taken on June 29, 1909, shows the same area from the slope of Rincon Hill (see Figure 4.45). The view is a near twin to the earlier 1871 Watkins photograph shown as Figure 4.09. The Oriental Warehouse is the large, four-square, sky-lighted building at the center. The front parts of the old Mail Dock sheds that once were lettered with "New York via Panama" and "China via Japan" still stand at the left. A three-masted schooner lies alongside the Second Street bulkhead (right of center) in line with the Mission Rock warehouses; the filled area just this side of the schooner was the location of the old Central Pacific car ferry slips. The site of the King Street Ship has been graded over; the ship's location on the vacant lot is identified by the cluster of horses and wagons across the Embarcadero from the Pacific Mail steamer lying at Pier 42.

Activities and Accidents--Looking for the King Street Ship Story

The task of searching through the daily press for a perhaps elusive item

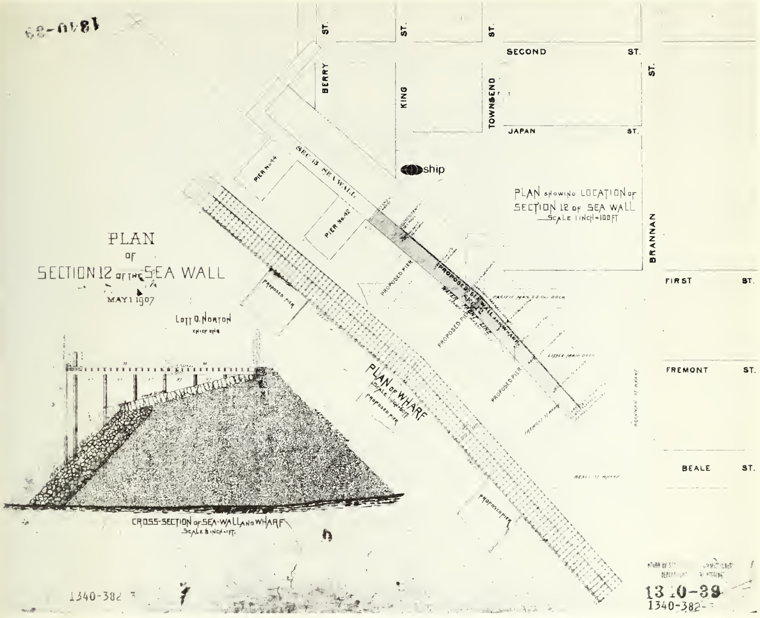


Figure 4.43: Engineer's Plan for Section 12 of the Seawall. . .reveals clearly how the old Pacific Mail Dock was cut off and filled in, burying a ship hulk in the process (see Figure 3.07 for photograph). (Harbor Commission ms.)

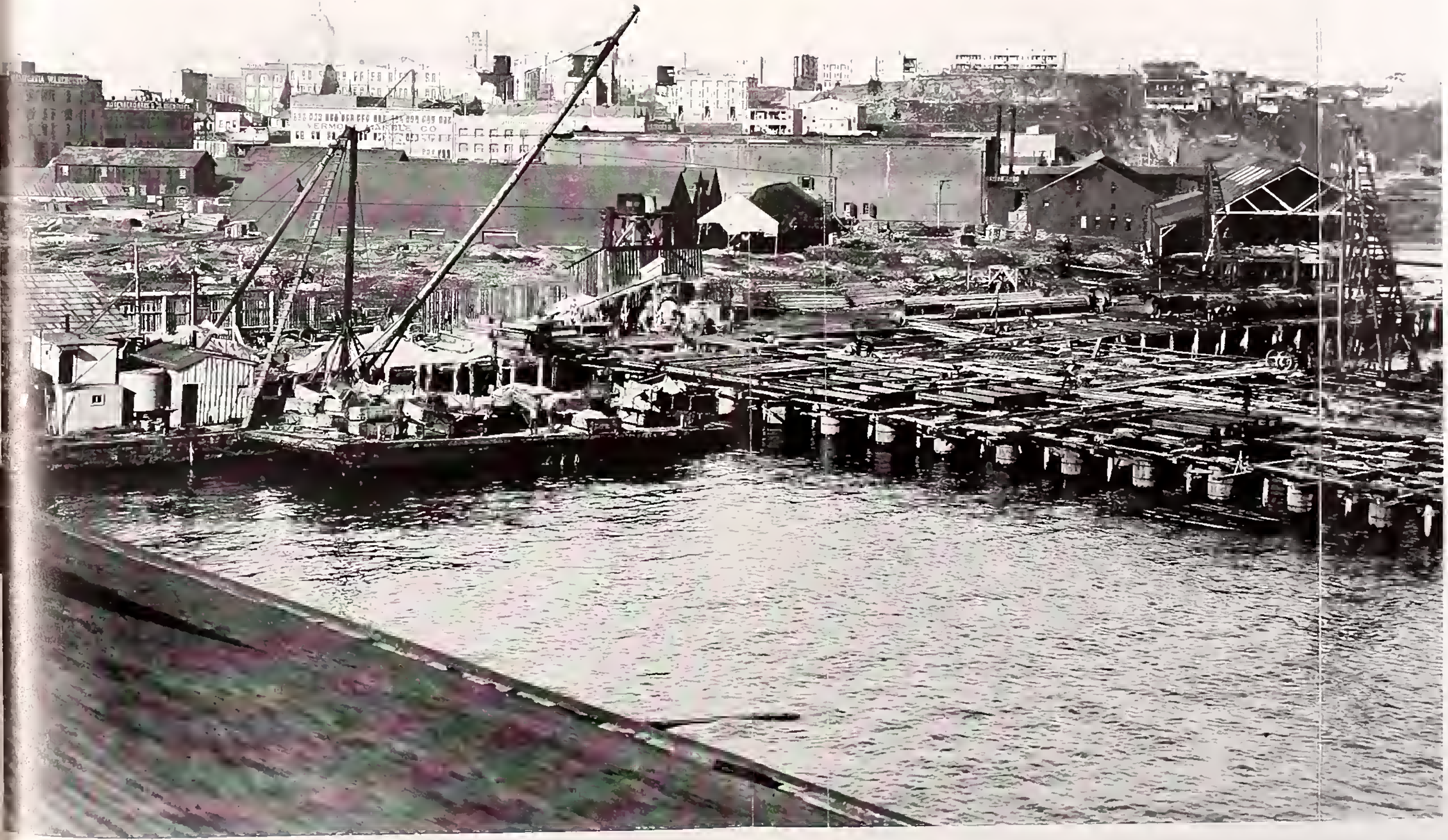


Figure 4.44: Filling the Pacific Mail Basin, 1908. . None of the views of filling near King Street shows the exact site of the buried ship. But this view, just to the north, shows how it happened. At the left, the peaked roofs show the remains of the Pacific Mail Dock sheds. At the center, Occidental Warehouse seems to be buried almost to the top of its doorways with new fill. Even a trash cart dumping onto this block between Townsend and King can be made out with a strong glass. (National Maritime Museum at San Francisco)

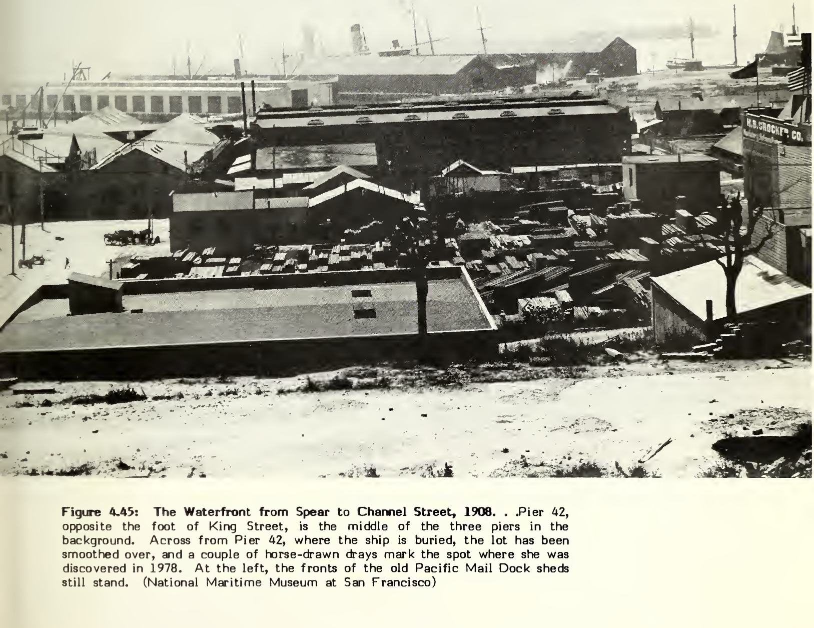
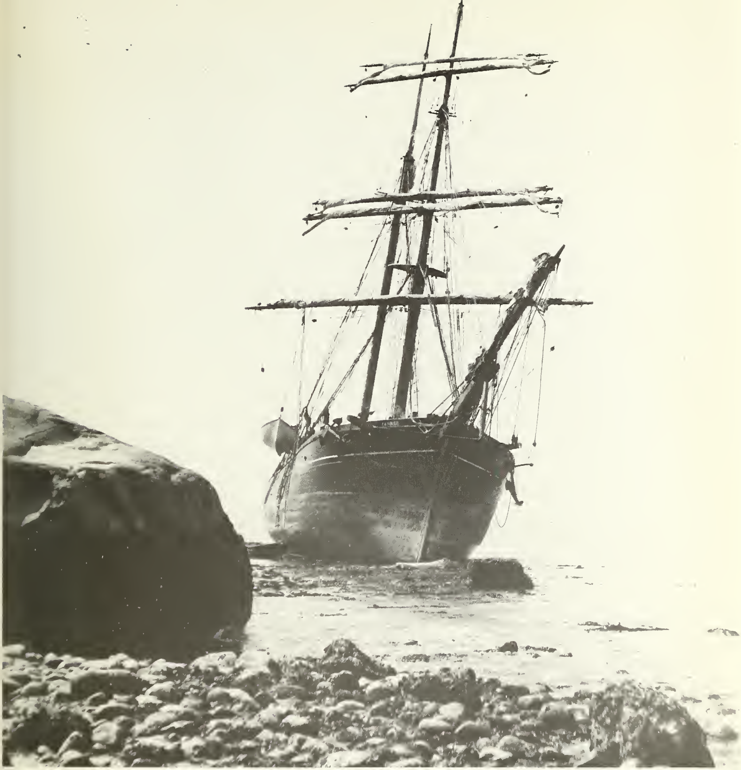


Figure 4.45: The Waterfront from Spear to Channel Street, 1908. . .Pier 42, opposite the foot of King Street, is the middle of the three piers in the background. Across from Pier 42, where the ship is buried, the lot has been smoothed over, and a couple of horse-drawn drays mark the spot where she was discovered in 1978. At the left, the fronts of the old Pacific Mail Dock sheds still stand. (National Maritime Museum at San Francisco)



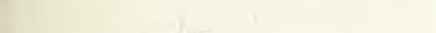


Figure 4.46: Odd and Old East Coast-Built Vessels Multiplied the Possible Candidates. . .The brigantine **Tanner**, built in Smithtown, New York, in 1855, kept cropping up in the news because of her frequent brushes with near total disaster. (National Maritime Museum at San Francisco)

Figure 4.47: Another Old-Timer. . .of the coast that seemed a possibility was the Barkentine **Fremont** built in 1850 in Philadelphia. The **Tanner** got out of fix she was in above; the **Fremont** wound up in the codfishing trade; and both were still sailing from San Francisco in 1907. (National Maritime Museum at San Francisco)

about a shipping loss in the harbor that quite possibly involved no spectacular (**i.e.,** "newsworthy") circumstances, such as loss of life, serious injuries, or extensive damage to currently valuable property, threatened to be a total waste of time if the demise of the ship just never made the news. However, the **San Francisco Examiner** carried a daily "Along the Waterfront--" column, containing the sort of minutia that would escape treatment as separate news items. The headline of the column varied, with such attempts at eye-catchers as, "Pacific Mail Will Not Pay $291,000 for Dock," "Tossed Like a Cork by the Giant Tidal Waves," "Sails Swept Away by a Terrific Gale," or "Wants Many Rocks in the Harbor Blown Up."

The reporter who covered the waterfront included the arrivals of the big steamers of the Pacific Mail Steamship Company religiously, listing all the prominent passengers that traveled cabin class, the number of Orientals (usually Chinese) who were arriving by steerage, the general amount of the cargo, and any news from the Far East. This was not due to any partiality to the Pacific Mail Company. It was a fact of life that the Pacific Mail had San Francisco's biggest passenger and cargo business, combined with the most frequent sailings of the biggest Pacific steamers of the times. But more important for the King Street Ship mystery was that **any** kind of waterfront accident, fire, theft, collision, or mishap was duly reported. If the accident was big enough or unusual enough and if the Russian revolution wasn't producing too much news or William Randolph Hearst wasn't running for political office, there was room for feature stories about shipping on San Francisco's waterfront, as well as the Pacific Coast, particularly if they involved any type of mishap. This meant that the researcher literally had to scan every microfilm page for what well might have been an item like this one:

> RISKS HIS LIFE BY
> STAYING ON BOARD
> BURNING VESSEL
>
> **Captain Reed of the Schooner Bessie Kay Sleeps and Is Asphyxiated by Fumes From a Fire, in a Cargo of Lime.**
>
> Weary of watching the burning cargo of his schooner Bessie Kay, on the mud flats at the foot of Third Avenue South,

> Captain Alfred Reed fell asleep on the vessel Sunday afternoon and was all but fatally suffocated by the fumes from the smoldering lime. When discovered, he was nearly dead, but was hurried to Central Emergency Hospital, where he slowly responded to the treatment given him.
>
> The Schooner Bessie Kay was bound north with a load of lime. Several days ago the cargo took fire. The vessel was run upon the mudflats. Repeated efforts to stop combustion failed.
>
> The crew left the boat, but Captain Reed remained on deck. Day and night he kept his post, but Sunday, tired nerves gave way and he drifted into slumber in the badly ventilated forecastle. The fumes wafted up from the hold and soon the Captain was unconscious. His case at first appeared hopeless, but persistent use of stimulants resuscitated him (**Examiner**, March 1, 1904).

Unfortunately Third Street "south" meant that the **Bessie Kay** was burning on the mud flats near Islais Creek. And a check of the **List of Merchant Vessels of the United States** for the year 1895 revealed that the **Bessie Kay** was a 98.41 ton schooner, built in 1893 in Alameda, California--84.5 feet long, 26.2 feet in breadth, and only 7.6 feet in depth. So as a recent, small, West Coast vessel, the **Bessie Kay** was not our ship. The wrong size, wrong coast, wrong fire. This was to be the story over and over again for the researchers.

What is important about the item is that it appeared as a feature story two times--when it caught fire and when faithful Captain Reed nearly died. In the instance of the **Bessie Kay**, there was also mention of her in "Along the Waterfront--"on March 20: "For fifteen days a fire has been burning in the **Bessie Kay** and all efforts to extinquish the flames have proved futile. As a last resort the schooner was scuttled and sunk in the waters of the Bay. She will be allowed to rest on the mudflats for twenty-four hours and then will be pumped out and raised" (**Examiner,** March 31, 1904).

By the time the microfilm (covering the 1903-1905 period) had been read, every fire checked out, all news on the building of the seawall duly noted, every whaling story printed out, plus all the oddities of such items as the story on the "Old Brig **Tanner**" noted (see Figure 4.43 and 4.46), it was with considerable frustration that the researchers decided they must take into account the possibility that the King Street Ship met her end at a slightly later or slightly earlier date. Until Section 12 of seawall was effectively closed off, it could have been possible (although extremely unlikely) that the vessel might have been beached there. There were stories of ships occasionally putting in at the beach at Second Street in an emergency situation:

> The steam schooner **Grace Dollar**, heavily laden with lumber, collided with the river steamer **St. Helena** early yesterday morning, well nigh sending the **St. Helena** to the bottom. So badly injured was the river craft that to save her from sinking it was necessary to run her a mile at the best speed possible and beach her at the foot of Second Street. By the time the shore was reached the water had nearly reached the engine room. . . . Captain McNulty quickly realized the danger to his vessel and its passengers. He swung the steamer around and ordered full steam ahead. With the tide he made fast progress but the rapid impouring of the water urged the crew to do their best. When about abreast of the Harrison Street Wharf and fearing each moment that she would sink, Captain McNulty ordered the boats be prepared for launching. The passengers were ready to jump into the boats . . . . The **St. Helena** was run on to the beach opposite the Mail Dock at Second Street and all yesterday and last night her cargo was transferred to another steamer. She will be put into dry dock today (**Examiner**, December 16, 1904).

Admittedly this event occurred within the original newspaper target dates of January, 1903, through April, 1905. But the teasing possibility that such an emergency might have occurred just before or just after the seawall's Section 13 construction dates gave us pause. Otherwise, we had overlooked the feature story--for by now we were sure that such an event would have been a feature story, if not in "Along the Waterfront--".

So it was decided to read some earlier years' papers and some later ones. The evidence on the King Street Ship did suggest the possibility of it having been involved in San Francisco's biggest fire of all. The 1906 earthquake did indeed delay the building of the seawall, interfering with the carrying out of contracts for construction during this heavy reconstruction period. Certain notes appeared from time to time in "Along the Waterfront--" with regard to decisions made at the Harbor Commission meetings--apparently always reported on Friday--and these decisions were sometimes relevant to extensions in time, contract amendments for the seawall, protests against prices for wharves, and the like. In addition to these reasons for continuing our research, items like the "Old Brig **Tanner**" kept turning up increasingly intriguing possibilities.

BRIG TANNER HAS VERY PERILOUS VOYAGE

> Men Forced to Work Pumps Day and Night, Threaten to Mutiny, but Captain Succeeds in Reaching This Port. With four feet of water in hold the brig **Tanner** crawled into the harbor yesterday, after battling for fourteen days with gales that at times threatened her destruction. Not only did Captain Helstrom have to contend with the elements, but he was forced to curb the mutinous spirit of his crew. The men wanted the skipper to take the vessel back to port from whence she sailed, but he obstinately refused to do so and held the vessel on her course until the port was reached.
>
> The **Tanner** is fifty years old and her sides are no longer able to withstand the battering of the seas. Before the vessel was well started on her voyage she began to leak, and from that time on the men were compelled to fight against the water rising in the hold, which at times threatened to put the vessel in a waterlogged condition.
>
> Fourteen days ago the **Tanner** left Port Angeles with a cargo of lumber for this port. All went well until the vessel struck a southeastern and then the seams opened up and the water poured into the hold. The crew were compelled to man the pumps and the windmill pump, and also a gasoline pumping engine was called into use to prevent the water from rising in the hold. The worried look in the faces of the sailors gave place to one of alarm when on the 6th of December the old brig ran into a stiff southeaster that heeled the vessel over completely.
>
> The gale of the 6th of December was the one that caused the sailors to attempt to dictate to the captain what measures he should take. They were impelled by fear, thinking that the vessel was doomed. The gale was encountered off Cape Flattery and the **Tanner**, bucking into it, lost two staysails and jib. The seams opened wide and the water poured through the apertures in torrents.
>
> First the windmill pump refused to work, then the gasoline engine broke down. The entire crew was compelled to man the hand pumps, and day and night they worked without rest. Slowly the water gained on them until it had crawled up five feet on the sides of the hold. Then the crew went in a body to the captain and demanded that he weather the brig and run her before the gale. They wanted to return to Port Angeles. The skipper refused to obey their bidding and hinted to the men he would use armed force if they persisted in their demands. On December 7th, the windmill carried away, but the engine was gotten in running order.
>
> Captain Holstrum stated yesterday that the mutinous spirit displayed by his men was actuated by a desire to be

> on terra firma. "I did not use any force, nor did I display any firearms. Had I been compelled to, I would have used force for I was determined to bring this vessel into this port" (**Examiner**, December 19, 1904).

Again the intriguing part of this story is that there was **no** follow up. Only the earlier note that "the Brig **Tanner**, the oldest sailing vessel on the coast, was reported outside by the Marine Exchange." Some days earlier still, there was another note that the **Tanner** "which has as many lives as the cat, was off Eureka."

The **List of Merchant Vessels of the United States of 1895** gives this information on the **Tanner:** Official No. 24451, H.S.B.G., **Brig Tanner,** 291.23 tons; 129 feet long, 29.7 feet wide, 11.7 feet deep; built in 1855 in Smithtown, New York; home port in 1895, Los Angeles. The **Tanner** continued to be listed through 1907. The **Coast Seaman's Journal** gives us some idea of her various uses. In December of 1899, "The old brig **Tanner** has been throughly overhauled and will be put in the Cape Nome trade in the spring along with the steam-schooner **Homer.** Walter Scammell will manage both vessels." And by January 17, 1900, the same journal noted: "The brig **Tanner** at Olympia, Washington, on the 13th from San Pedro, was recently purchased by Walter S. Scammell and has been made over into a practically new boat. She will bring a load of lumber from Olympia to San Francisco." (In 1900, San Francisco was listed as her home port).

On May 23, 1900, the **Coast Seamen's Journal** noted again, "The brig **Tanner,** bound to Cape Nome with a cargo of lumber, recently went ashore two miles below Point Wilson, Washington. She has since been floated." And again the journal wrote on July 10, 1901: "The captain of the brig **Tanner,** lately arrived at Honolulu from Port Blakeley, reported that Harry Hix, a seaman, committed suicide by jumping overboard." In January of 1902, the **Journal** reported, "The Brig **Tanner** from Port Blakely for Honolulu with lumber, put into San Francisco on January 22 for repairs. On January 8th one of the windmill pump boxes broke and the main pump also got out of order. She was repaired and sailed again on January 25." Apparently the **Tanner** was continually being put back together again and used for a variety of cargo routes from Nome to Honolulu. In 1907 her home port was San Francisco.

Occasionally an article would appear in the **Examiner** that would have a potential candidate for the King Street Ship almost buried among the less likely possibilities:

> ### IMMENSE FLEET OF SAILING VESSELS REACHES PORT
>
> Largest Number of Ships to Arrive in One Day in Years Recorded Yesterday--Quarantine Officers are Kept Busy--A glimpse of the lower part of the harbor yesterday casued the old stagers of the front to grow reminiscent of the days before the steam craft became such a potent factor in our commercial life. From the ferryboats that crossed the Bay the eyes of the passengers, which were turned toward the Golden Gate, encountered a sight that is seldom seen in this harbor. Dangerously close to one another, an immense fleet of sailing vessels was anchored, and their masts outlined against the sky, had all the appearances of a vast growth of trees. . . . Through the Golden Gate yesterday there passed into the harbor the largest fleet of windjammers that had been recorded as arriving in a single day for many years. . . . A thick haze hung over the Heads, and the fleet was close in before it was discovered. The first to loom up were the schooners **Defender** and **Okanogan** and the barks **Parameta** and **Isaac Reed.** Close behind them were the schooners **H. C. Wright** and **Vine** and the ships **Lucile** and **Star of France.** . . . The second group led by the barkentine **Fremont.** . . (**Examiner,** September 11, 1904).

The mention that the **Fremont** was a codfisherman caught the researcher's eye. The Pacific codfishery was a much different operation than the familiar Gloucester-based industry. On the Pacific Coast the fishing schooners made five- or six-month voyages to the distant Bering Sea banks. Thus, rather large vessels were used, and no special type of codfishing schooner (comparable to the East Coast type) was ever developed. Usually, old lumber schooners of middling size served the purpose--but the **Fremont** (see Figure 4.47) did not ring a bell as a lumber schooner.

Checking the **List of Merchant Vessels of the United States** for 1900, we find that the **Fremont** was built in Philadelphia in 1850. Her register number was 9520 (as opposed 9275 on the "nameboard" found with the King Street Ship). Her dimensions made her a likely candidate, as well as her age and origins--155 foot length, 26 foot breadth, 12 foot depth, 345 tons. The **Coast Seamen's Journal** had a note about the **Fremont** on March 23, 1898: "The old bark **Fremont** has been taken out of Oakland Creek, California and will be put in the codfishing trade."

So here is a case that fits the theoretical model for the King Street Ship. An old East Coast-built vessel, laid up on the mudflats of Oakland Creek, brought out in March of 1893 to operate in an active but somewhat marginal and exotic trade. But the **Fremont** is still found in the list of active merchant vessels in 1907.

Whalers Made Good Copy

On October 26, 1905, when the **Examiner** front page headline read, "Believe that 3,000 Jews Have Been Executed in Russia," the same front page featured the story, "See Mirage of City on Bering Sea at Night . . . Crew of Whaling Bark **Gayhead** Just Returned From Northern Seas, Tells of Phenomenon That Startled Them on Voyage." It was a combination of elements that made the whalers and their adventures always good enough copy to drive other stories to more obscure back pages. First, the whaling voyages were the longest and the most dangerous speculative ventures that a seaman could sign on for. The ships themselves were old by anyone's standards and patched up for use year after year in spite of predictions like this letter from a whaling master to her owner, written in 1889: "The old **Hicks** is about the same old sixpence only getting mighty shaky, her rigging is in terrible shape about ready to fall off of her. I shouldn't be surprised to see the mainmast go over the side any day. She has the same old leaks only worse than last year, 20 minutes a day steady; its forward somewhere, you can hear it running in but you can't tell where" (Hare 1960:102). Yet the **Andrew Hicks**, seen in Figure 4.48, was reregistered in San Francisco as a home port in 1907 and according to Hare was still afloat in 1916 when she was lost in the Atlantic in the First World War as a merchant ship. The sight of a whaler drying her sails, as in Figure 4.49, or even a beached whaler on the mudflats, like the view of the bark **California** in Figure 4.50, reminded people that the old style New Bedford whaling ships were still around in the 1900s. The whalers were probably the oldest class of wooden sailing vessels in active service in San Francisco at the turn of the century. It might be said that it didn't pay to build ships like these any more but it certainly paid to keep them patched up and sailing--and this in itself gave them a heroic quality of survival that was much appreciated in San Francisco. The romantic quality made good copy. The economic reasons for their persistence and periodic resurrection were summed up in a letter, written in August of 1906 by the United States Consul Gabriel Bie Ravndal, of Dawson, Yukon Territory:

> During the year 1905, if I am correctly informed, the total number of bowhead whales caught by the north Pacific fleet was 74. They yielded 118,715 pounds of bone. One of the largest catches was made by the **William Baylies.** She
>
> brought home to San Francisco 35,000 pounds of bone, valued at $150,000. The total tonnage of whalers sailing from San Francisco consists of ten steamers and barks and six schooners, with a total tonnage of 3,766. Seven vessels escaped before the ice closed in and are now starting on their spring run north. The former American whaling fleet of some 1,000 vessels, plying all seas of the earth, since the advent of petroleum has dwindled to about 15 sailing from New Bedford, and less than 20 sailing from San Francisco. In 1857 the whaling industry of New Bedford had reached its highest point. At that time its fleet was worth more than $12,000,000 and required 10,000 seamen. Then came the Civil War and the discovery of mineral oils, and the whale fishery received its death blow (**Coast Seamen's Journal**, August 1, 1906).

It was the considered opinion of Captain A. H. McGregor, of the steam whaler **Karluk**, writing from Herschel Island, ". . . if the bowhead is not protected he will soon be exterminated, not by the whale ship, but by the ruthless slaughter or irresponsible shore fisheries or whaling stations." McGregor's prediction was shared by Captain W. F. Macomber of the steamer **Thrasher**, writing again from Herschel Island in March of 1906: ". . . the bowhead is being gradually exterminated, not so much by catches by ships, as there are at present only 12 steam and gasoline vessels in the business, but by the irresponsible parties on shore whaling carried on from Point Barrow to Point Hope--where whales, mostly the young ones, are bombed from the ice floes and boats, with a small percentage of them saved" (Ibid.).

But if the predictions for the future of whaling in 1906 were gloomy,

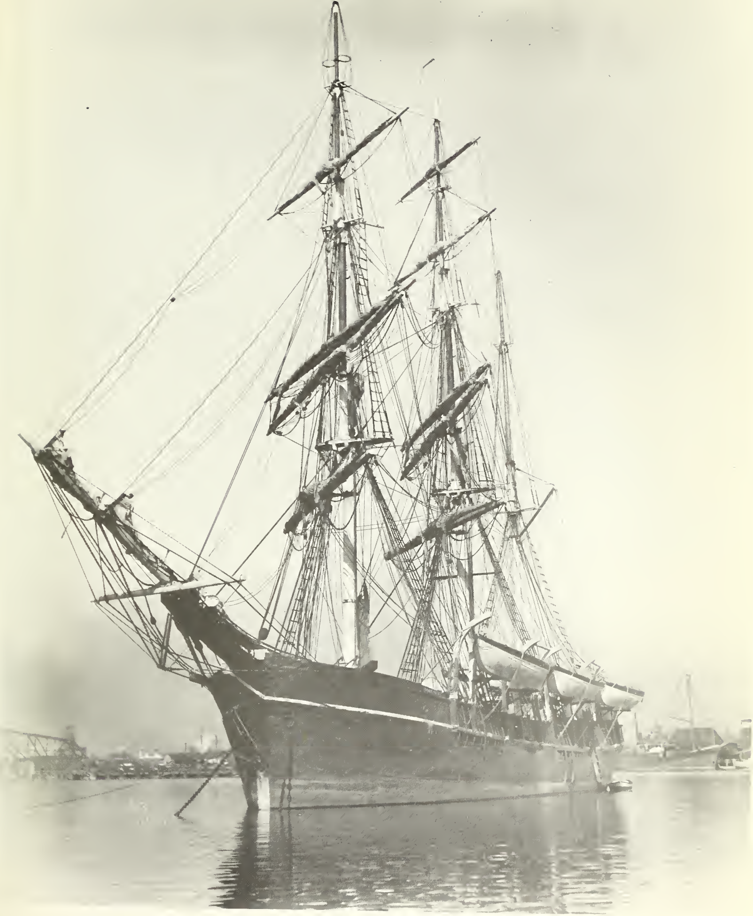


Figure 4.48: **The Andrew Hicks Came Close to Meeting the Specifications. . .** This sparkling view shows the old whaling bark between voyages with her sails furled, whale boats all in place. In 1899 she had taken five whales in the Ohkotsk Sea; in 1900 she brought back nine bowheads. The **Hicks** is an example of the post-1850 "clipper" type of whaler, being a product of Fairhaven, Massachusetts, in 1867. (Bancroft Library)

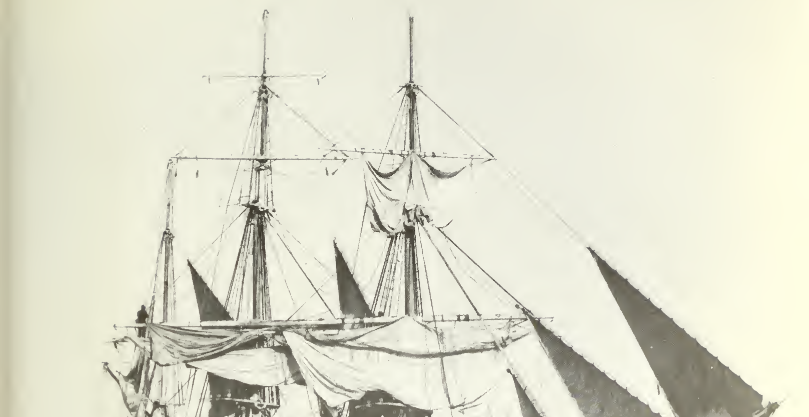


Figure 4.49: A Whaler Dries Her Sails in the Sunny Waters of Oakland Creek, 1886. . .The creek was the sanctuary for the whaling fleet between voyages. Perhaps this ship is the **Stamboul** or the **Hunter.** The **Stamboul** was built in 1843 in New Bedford, and the **Hunter** rose from the shipyards of Bath, Maine, in 1854. They were both sailing from San Francisco at the time of this poetic view. The **Stamboul** may have ended her days as a sheer hulk in Benicia; the **Hunter** was crushed by Arctic ice, on her way from Dutch Harbor to home in July, 1900. (Bancroft Library)

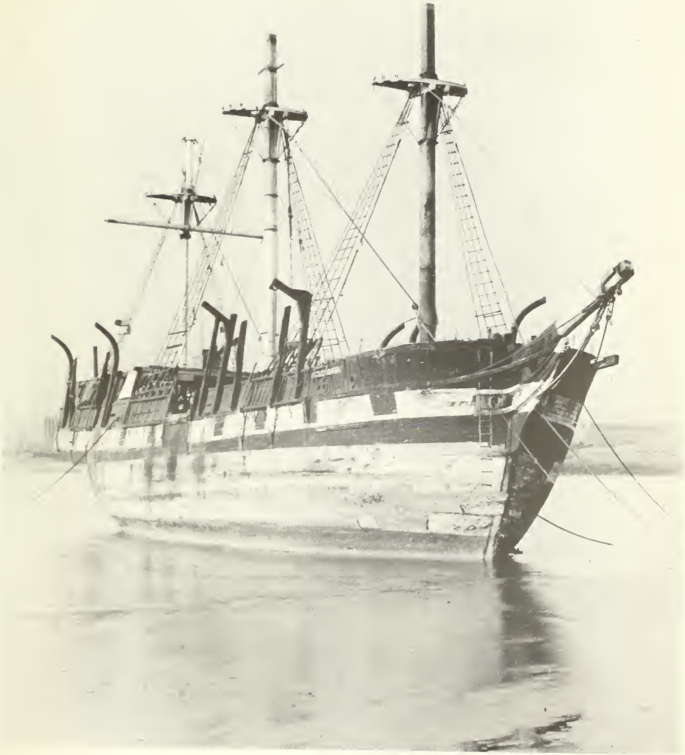


Figure 4.50: The Last Days of the Whaling Bark, California. . .Hare says "She ended her days in the boneyard of Marin. . ." and drawings show her being stripped down to her ribs. Built in New Bedford in 1842, she was still registered there in 1907, although San Francisco was her port of sail. A bark of 366 tons, she was 114.4 feet in length, 28.1 feet in breadth, and 18 feet in depth of hold. In this undated view, the worm damage on her wooden sheathing is in striking contrast to the undamaged sheathing in the **Lydia**, a whaler of nearly the same vintage. (Bancroft Library)

and correct, looking back to the recent past at that time made it clear as to the speculative nature of the business. The note on the **Baylies** checked out in the **Examiner:**

> ### WHALER BRINGS IN RICHEST CATCH IN YEARS
>
> Nearly a quarter of a million dollars worth of whalebone was brought here yesterday by the steam whaler **William Baylies**, and for the first time in years the members of the crew of a whaler fitting out at this port will have a respectable pay day. Sixteen whales were caught in all. And strange, they were captured in the same vicinity, where others of the fleet were operating, but which came home with just enough to clear the expenses of the cruise. . . . The catch of 16 whales will total nearly 36,107 pounds of bone, and figuring at $6 per pound, the value of the cargo will be $216,642. It is thought that the price will be somewhat higher on account of the rest of the fleet being tied up in the ice in the Arctic for the winter. Captain Bodfish will receive about $16,000, the chief engineer about $10,000, first mate $8,000, second mate $5,000, third mate $3,500, fourth mate $2,000 and the fifth mate about $1,100. The men will receive about $300 each. Seldom has a whaler entered this port with the men on board so enthusiastic over the cruise, and a number of waterfront saloons were preparing last evening to do a great business.
>
> A decided contrast to this was the homecoming of the whaling bark **California.** She arrived later in the day, and when she dropped anchor in the harbor, all hands were casting longing glances at the steam whaler swinging anchor a short distance away. She brought only 2,000 pounds of bone and about 350 barrels of oil, which will probably clear the expenses of the owners (**Examiner**, November 4, 1905).

Either Captain Bodfish was lucky, or he had shown the wisdom of experienced seamanship when he chose the precise time to leave the Arctic for San Francisco. Four days later an unusually early appearance of ice closed in the whaling fleet, leading to dramatic stories that followed. In passing it should be noted that the **Baylies** was unusual in that she was built in Bath, Maine, in 1886 as a sailing bark for whaling and was converted to steam in 1894. In all, she made 20 voyages from San Francisco before she was crushed by ice in Anadyr Gulf (Bockstoce 1977:102).

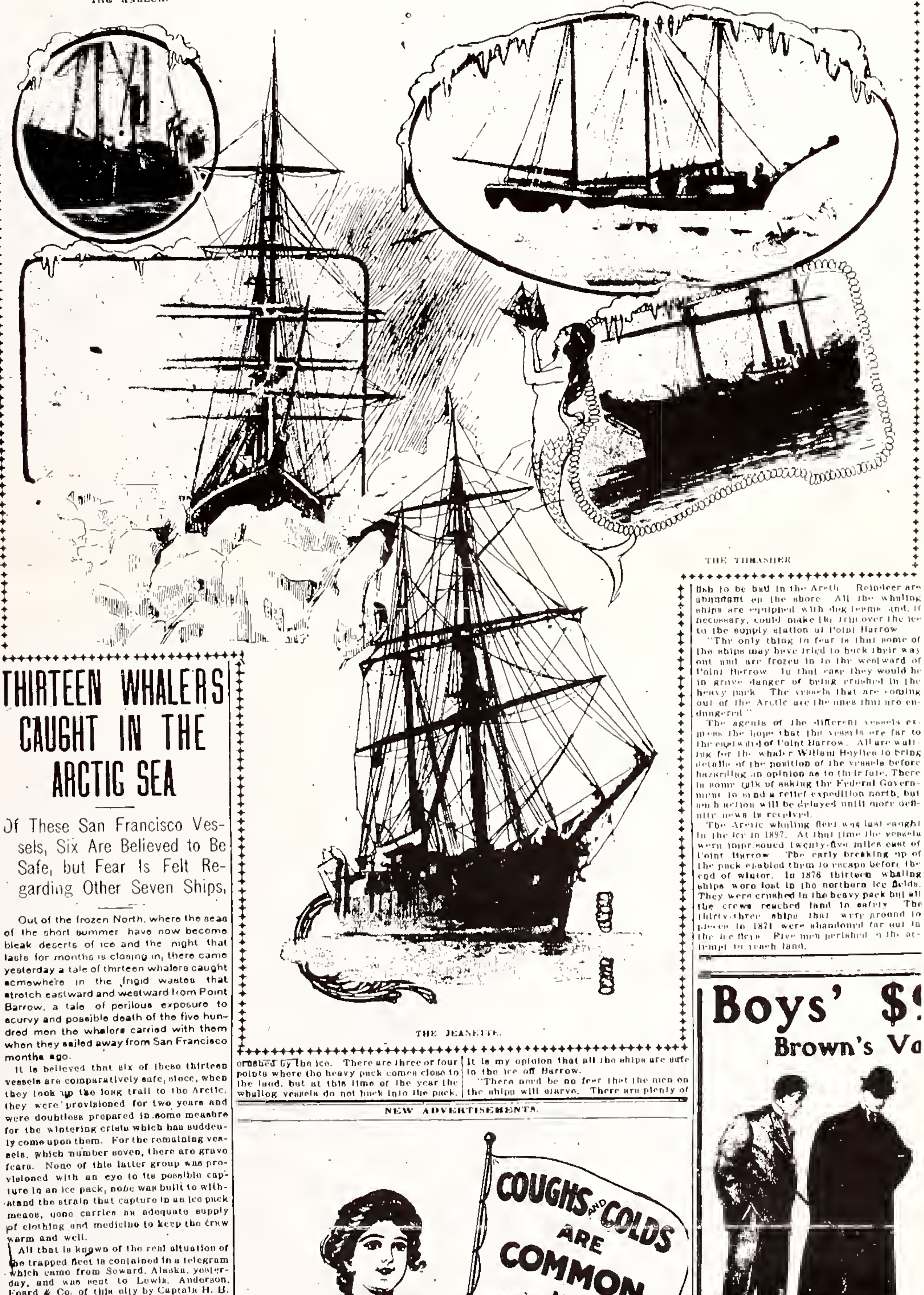
The whaling bark **California**, mentioned in the article above, was an early candidate for the King Street Ship given her age and dimensions. As seen in Figure 4.50, she was an old-style New Bedford whaler, built there in 1842; she measured 366 tons, and was 114.4 feet in length, 28.1 feet in breadth, and 18 feet deep. According to Hare she was junked in the early 1900s in San Francisco. She is still listed in the **List of Merchant Vessels of the United States** in 1907. As seen in Figure 4.50, of an unknown date, she was probably lying in Oakland Creek, and the worm damage to her sheathing is evident upon close examination, unlike the sheathing of our King Street find. Hare's description of her exposed ribs as she was stripped down has the ring of authenticity, and drawings and scrimshaw exist of the **California** being taken down as described in Hare's **Salted Tories; The Story of the Whaling Fleets of San Francisco.**

The dramatic stories of whalers caught in the Arctic Sea followed in the **Examiner** for days following the return of the **Baylies** and the **California.** Figure 4.51 shows the **Karluk,** the **Jeanette,** and the **Laura Madsen.** The **Karluk** was a brigantine built in Benicia in 1884 for the Alaska salmon trade. The newspaper account described the predicted disaster in the Arctic--a disaster that would have by no means been unprecedented in scale. As it turned out, there was no general catastrophe on this occasion, but the ice claimed a ship or two, as it did in most years.

Expanding the Time Span with the Coast Seaman's Journal, 1896-1906

Midway in the daily newspaper search for the identity of the King Street Ship, a complete run of a weekly newspaper devoted to shipping news of particular interest to the Pacific Coast turned up at the University of California Social Science Graduate Library--the **Coast Seaman's Journal**--which bore the masthead seen in Figure 4.52. The official organ of the National Seamen's Union of America, it was "A journal of seamen, by seamen, for seamen. Our aim: The Brotherhood of the Sea. Our Motto:

DEATH THREATENS 350 SAILORS IN THE FAR NORTH



SOME OF THE SAN FRANCISCO WHALING VESSELS BELIEVED TO BE IMPRISONED IN THE ICEPACK IN THE ARCTIC OCEAN. THE PHOTOGRAPH OF THE LAURA MADSEN WAS TAKEN WHEN THE CRAFT WAS CAUGHT IN THE ICE A YEAR AGO.

THE KARLUK.

THE LAURA MADSEN

THE THRASHER

THE JEANETTE.

THIRTEEN WHALERS CAUGHT IN THE ARCTIC SEA

Of These San Francisco Vessels, Six Are Believed to Be Safe, but Fear Is Felt Regarding Other Seven Ships.

Out of the frozen North, where the seas of the short summer have now become bleak deserts of ice and the night that lasts for months is closing in, there came yesterday a tale of thirteen whalers caught somewhere in the frigid wastes that stretch eastward and westward from Point Barrow, a tale of perilous exposure to scurvy and possible death of the five hundred men the whalers carried with them when they sailed away from San Francisco months ago.

It is believed that six of these thirteen vessels are comparatively safe, since, when they took up the long trail to the Arctic, they were provisioned for two years and were doubtless prepared in some measure for the wintering crisis which has suddenly come upon them. For the remaining vessels, which number seven, there are grave fears. None of this latter group was provisioned with an eye to its possible capture in an ice pack, none was built to withstand the strain that capture in an ice pack means, none carries an adequate supply of clothing and medicine to keep the crew warm and well.

All that is known of the real situation of the trapped fleet is contained in a telegram which came from Seward, Alaska, yesterday, and was sent to Lewis, Anderson, Foard & Co. of this city by Captain H. H. Bodfish of the steam whaler William Baylies.

"The fleet is frozen in eastward," ran this message. "Monterey and myself out. Twenty-two thousand pounds for Baylies. Eighteen whales. Three ships."

Part of the information is puzzling, as nobody seems to know the key to the clauses about three ships and eighteen whales, but the 22,000 pounds for Baylies means that the vessel has so many pounds of whalebone in her hull—worth nearly $130,000—and the announcement that the fleet is frozen in eastward is apparently only too plain. If the interpretation furnished by the local agents is correct, it means that seven vessels, every one of which carries fifty men, are caught in an icepack from which they cannot escape till spring, and possibly not even then, and that their crews must escape from the threat of starvation and disease by dog teams, a method of retreat with which all these craft are fortunately provided.

The whalers that went north intending to winter there are the steamers Beluga and Narwhal, the gasoline schooners Charles Hanson and Herman, the Olga and the Bonanza. These are supposed to be snugly quartered near Point Barrow or Herschell Island. The vessels thought to be endangered are the Thrasher, Captain William F. Macomber; the Jeanette, Captain E. W. Newth; the Karluk, Captain A. H. McGregor; the Alexander, Captain James A. Tilton; the Bowhead, Captain John A. Cook; the Belvedere, Captain S. F. Cottle, and the Laura Madsen, used as a provision tender, commanded by Captain Philip Cook.

Captain L. W. Williams, a whaling skipper who has hunted the leviathans in the Arctic for the past thirty years, takes a hopeful view. He states that the sailors will not suffer from the pangs of starvation nor will the ships be crushed by the ice pack. Captain Williams commanded the whaler Florence, that was in the Arctic in 1871, when thirty-three whaling ships were lost. Williams said yesterday:

"There is no danger to whaling ships over on the east shore, and it is there, I am sure, the vessels are. The captains are not men to run their ships far out into the pack. I do not expect that any of the vessels will come to harm in the ice.

"East of Point Barrow the water is shallow and freezes before the heavy pack comes in. The ships can freeze in to the eastward of Barrow and lie close to the beach without being in danger of being crushed by the ice. There are three or four points where the heavy pack comes close to the land, but at this time of the year the whaling vessels do not buck into the pack. It is my opinion that all the ships are safe in the ice off Barrow.

"There need be no fear that the men on the ships will starve. There are plenty of fish to be had in the Arctic. Reindeer are abundant on the shore. All the whaling ships are equipped with dog teams and, if necessary, could make the trip over the ice to the supply station at Point Barrow.

"The only thing to fear is that some of the ships may have tried to buck their way out and are frozen in to the westward of Point Barrow. In that case they would be in grave danger of being crushed in the heavy pack. The vessels that are coming out of the Arctic are the ones that are endangered."

The agents of the different vessels express the hope that the vessels are far to the eastward of Point Barrow. All are waiting for the whaler William Baylies to bring details of the position of the vessels before hazarding an opinion as to their fate. There is some talk of asking the Federal Government to send a relief expedition north, but such action will be delayed until more definite news is received.

The Arctic whaling fleet was last caught in the ice in 1897. At that time the vessels were imprisoned twenty-five miles east of Point Barrow. The early breaking up of the pack enabled them to escape before the end of winter. In 1876 thirteen whaling ships were lost in the northern ice fields. They were crushed in the heavy pack but all the crews reached land in safety. The thirty-three ships that were ground to pieces in 1871 were abandoned far out in the ice floes. Five men perished in the attempt to reach land.

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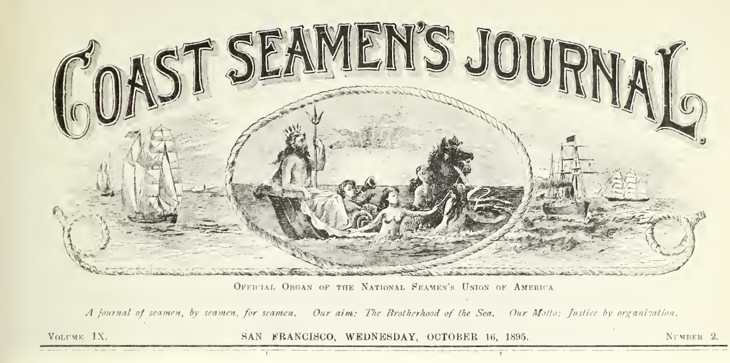
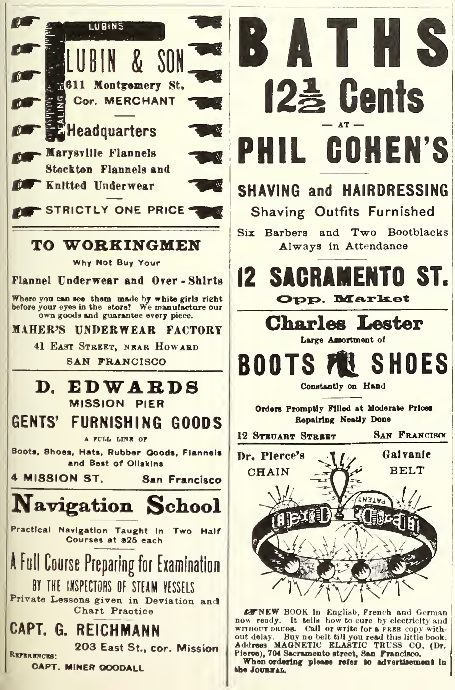


COAST SEAMEN'S JOURNAL

Official Organ of the National Seamen's Union of America

A journal of seamen, by seamen, for seamen. Our aim: The Brotherhood of the Sea. Our Motto: Justice by organization.

Volume IX. SAN FRANCISCO, WEDNESDAY, OCTOBER 16, 1895. Number 2.



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When ordering please refer to advertisement in the Journal.

Figure 4.52a and 4.52b: From 1887 to 1937 Sailors of the Pacific Slope had a Common Voice. . . ."Let a seafaring man but step across a room, speak a sentence or two, and nine out of ten observing sailors can tell the class of vessel he is accustomed to, be it a deep-water ship, steamer, coasting schooner, tow-barge, or yacht. . .Another curious advantage which the coast sailor possesses over his deepwater brother, is that his dishes are washed for him by the cook and passed in clean with the next meal. Anyone who has been to sea, even as a passenger--who has divined the intense self-respect of a sea-cook, and has watched a sailor swabbing out his tin plate with a rope's end--will realize that this is an uplifting tradition, worthy of America." So wrote the **Coast Seamen's Journal** in July of 1901. And if you didn't like the literature, you could always read the news or peruse the ads.

Justice by Organization." It was a long-lived journal of great interest to maritime historians, which curiously wound up in the Graduate Social Science Division of the University at Berkeley, rather than the Bancroft Library. The magazine lasted from November 1887 to June 1937. One column in particular was copied for research purposes, "Pacific Coast Marine." As a weekly column, it could hardly be as detailed as the **Examiner's** "Along the Waterfront--", but items concerning "old" vessels were written up in more precise detail than were many others. Any kind of ship disaster appeared in this column, as well as the economic reasons for various ship conversions. Certain classes of information were missing, such as the local reporting on the San Francisco Harbor Commissioners' decisions that directly affected the building changes in contracts for the seawall.

The use of the weekly "Pacific Coast Marine" column enabled the researchers to expand the time studied from 1896 through 1906--for a total of 572 columns. These copied columns were gone over for several classes of information, clipped and bound for reference in tracing individual vessels. For example, "the old whaling bark **Alaska**" was followed through the years. All of the following notes are from the **Coast Seamen's Journal** for those dates cited. "November 17, 1897: "The whaling bark **Alaska** will be fitted out at San Francisco for a prospecting cruise in the spring with two hundred passengers. She will go to Kotzebue South, where, it is reported, the Esquimaux 'scoop up gold with their paddles'."

The gold rush to the Klondike started in the summer of 1897, and this meant that old vessels formerly considered too leaky to put out to sea were appraised with a new eye as to the economic viability of getting gold hungry prospectors north at rates that were to become more and more lucrative. By August 24 of 1898 she was apparently making her first voyage: "The bark **Alaska,** about which some fear has been felt, arrived safely at St. Lawrence Island, Alaska on the 16th of August." By May 17, 1899, "The Bark **Alaska** and the barkentines **A. Falkenburg** and **Catherine Sudden** are being got ready at San Francisco for a trip to the Alaska Gold Fields." By February of 1900, "The whaling bark **Alaska** will be placed on the route from San Francisco to Cape Nome on March 1st. She is said to have 'splendid accommodations' for about one hundred passengers. After landing her passengers at Cape Nome, the **Alaska** will go for a whaling cruise." Just how lavish her accommodations may have been can be judged by checking the **Annual List of American Merchant Vessels** for her vital statistics. Her signal numbers are a clue to her age--1378 indicates a very old vessel, built in 1867 in Mattapoissett, Massachusetts, and registered at home port in San Francisco in 1900. She measured 340 tons and was 122.2 feet in length, 28.9 feet in breadth, and 16.90 feet in depth. "Fares from Seattle to Nome will be increased during the coming season from $75 to $100 and $125," reported the **Coast Seamen's Journal.** At the same time accommodations from San Francisco to Seattle were running $100, so the old whaling bark **Alaska** could figure to clear $20,000 with 100 passengers before commencing her whaling voyage. The gold fever was fed with news like, "The **Zealandia** arrived in San Francisco on June 29, 1900, eight and a half days out of Nome, with a number of passengers and $370,000 worth of gold. . ." (Ibid., July 4, 1900). The breadth of the **Alaska** was given as 28.9 feet--about 1.9 feet too broad to be the King Street Ship. However, it was these news items that removed the **Alaska** from possible consideration: "The Old bark **Alaska,** from San Francisco was beached in a heavy storm at Cape Nome on June 5. She will be a total loss" (Ibid., July 4, 1900), followed by this note, "Captains Green and Cogan of the wrecked bark **Alaska** are ill from typhoid fever and Captain Morine of the wrecked barkentine **Catherine Sudden** is in the hospital in Nome, suffering from cancer of the throat" (Ibid., July 18, 1900).

It must be emphasized that the notice of a ship being wrecked in the Arctic was sometimes followed by a story of her mysterious ressurection, sometimes months or even a year later. However the note about the captain's illness would seem to confirm that the **Alaska** was indeed gone.

The **Catherine Sudden** and the **Jane Falkenburg** were both checked for dimensions and the story of their adventures. "Another old veteran is to go into the Cape Nome trade. The barkentine **Catherine Sudden** has been brought over from Oakland Creek and is being refitted and renovated. She is chartered by J. H. Bruce to carry freight and passengers" (Ibid., March 14, 1900). By July 4 of that same year, "The barkentine **Catherine Sudden,** which was badly injured in the ice, has arrived at Nome in tow of the **Corwin.** The cargo is badly damaged and the vessel and cargo will be sold. . . ." And later, "The wreck of the barkentine **Catherine Sudden** has been sold for salvage at Cape Nome. When she left San Francisco, Cal., her cargo alone was valued at $125,000 but the entire proceeds of the sale brought only $9,895." Finally, a view discovered in the Alaska collection at the Bancroft Library dated September 19, 1900, shows the wreck of the **Catherine Sudden** in ice at Cape Nome. It should be mentioned that data is not always brought together in the most useful order. The information that the **Catherine Sudden** was a West Coast-built barkentine from Port Ludlow, Washington, in 1878 was not available when she was first located in the **Coast Seamen's Journal.** The news of her wreck at Nome with the picture came **after** she had effectively been removed from a list of possibilities for the King Street Ship.

The **Jane Falkenburg** was a story of much the same class. In June of 1899 she was brought out of Oakland Creek and sailed from San Francisco for Port Hadlock, Washington. By November of that same year, "The barkentine **Jane A. Falkenberg** was abandoned on the 16th off the northern coast having been dismantled and waterlogged on the 10th, on passage from Port Hadlock to San Francisco with lumber. The crew, consisting of the master, two mates, four seamen, and a Chinese cook, clung to the wreck without food and with only rainwater to drink for six days, when they were taken off by the steamer **Walla Walla** and brought to San Francisco." The **Falkenberg** was afterward picked up by the British Columbian tug **Lorne** and towed to Esquimalt, B. C. She was built in New Bedford, Massachusetts, in 1854 and soon considered unseaworthy. But by January of 1900, "The barkentine **Jane Falkenburg,** which was recently abandoned on the Coast in a waterlogged condition and afterward towed to Esquimalt, B.C., has been rerigged as a schooner and will be sent to Cape Nome with her original cargo of lumber." Apparently her final demise came in November 18, 1903: "The old barkentine **Jane A. Falkenberg** has been sunk by the Northern Commercial Company as a breakwater to protect the dock in St. Michael's Bay, Alaska. . . . The vessel was operated as a whaler first on the Atlantic and then on the Pacific Ocean."

A List of Whaling Candidates to Track

> The difficulties in the way of collection of historical notes increase greatly with the lapse of years. Newspapers, which must always be considered, where they exist, invaluable aids in the prosecution of such matters, pass from the possession of the very few who, when living, treasured them, and fall into the hands of those who only value them at so many cents per pound. Those who were the actors in the scenes which it is desired to describe die, and with them perishes the source of information, which ultimately, in the form of tradition, becomes too distorted to be available (Starbuck 1964: 1).

It may be said that Alexander Starbuck, writing in 1878, was not living in the enlightened age of modern librarianship, in which even though the private collection of newspapers disappears in the garbage trucks, complete sets are preserved in public institutions for the benefit of future scholars. However, for example, attempting to gather further information on a Gold Rush ship (presumed the **William Gray** of Bath) lying in the Levi's Plaza development in San Francisco, only one of many daily San Francisco newspapers of 1852 was found preserved for reference. We also would question what has happened in the last few decades to vast stores of bound volumes of newspapers that have been microfilmed, usually in a format and quality of film apparently designed to blind future generations of scholars. In some cases, libraries have preserved the original volumes in dead storage, where they may be resurrected when a superior photographic technology comes along. But much may have been lost--that is, relegated to inferior microfilming--in the interest of saving space and feeling "progressive."

Alexander Starbuck's monumental **History of the American Whale Fishery from its Earliest Inception to the year 1876** was followed by Reginald B. Hegarty's **Returns of the Whaling Vessels Sailing from American Ports; 1876-1928: A continuation of Alexander Starbuck's History of American Whale Fishery."** And it was with this second volume that we started our list of candidates.

Assuming only that we were dealing with a whaler that would have sailed out of San Francisco in the 1880s and no later than 1907 (when the seawall was constructed in that section of the waterfront), we listed every whaler going out of San Francisco from 1876 on. The number of whalers starting with the **Florence,** which was lost in the Arctic in 1878, was 64. Hegarty, like Starbuck, got his records from newspaper accounts and from official government records. It was possible to trace all 64 vessels and eliminate all but 16 vessels as having perished in accidents at sea. There were other whalers that were listed as "withdrawn." There were others that were listed, like the **Francis Barstow,** as "sold in Bermuda in 1900." There were others that were sailing too long to be included in our search, such as the **Wanderer,** built in 1878 in Mattapoisett, Massachusetts, whose dimensions very closely matched the estimated King Street Ship dimensions of 116.2 feet in length, 27.6 feet in breadth and 15.8 feet in depth, measuring 303 tons. But the **Wanderer,** after working for the movies, was sailing out of New Bedford in 1924 when she wrecked on the Atlantic Coast.

There were others, like the **Northern Light,** that were just too big. The **Northern Light** was built in 1851 in Rochester, Massachusetts, and was still sailing from San Francisco in August of 1900. "The bark **Northern Light** arrived in Seattle last week from Cape Nome with forty-eight passengers in excess of her license limit. A fine of ten dollars for each passenger was imposed and the forty-eight passengers had their passage money refunded. The whole charges on the vessel amounted to $2,500 which was paid" (**Coast Seamen's Journal,** August 19, 1900). The **Northern Light** was a bark of 384 tons, 128.4 feet in length, 30.3 feet in breadth (much too wide for the King Street Ship), and 17.9 feet in depth.

The list was carefully narrowed down to 12 whalers to be tracked to their positive destruction in order to be sure that they could not be the King Street Ship. Through the **List of Merchant Vessels of the United States** it was possible to get each ship's signal letters, numbers, dimensions, the date that she was built, and where. This annual list also included the home port where the ship was registered, and such useful information as "name changes", although we found cases where such information was not included, even though it appeared in the local daily press. The "home port" listing was not as useful as one might suppose, as many of the San Francisco whalers continued to be registered at New Bedford, though they sometimes never saw that port again.

Alliance: Our twelve whaler candidates started with the **Alliance,** which was really included because so little was known about her. Hegarty lists her last voyage out of San Francisco as 1886, but he had no knowledge of her final end. The **Alliance** was a bit of a sport, in that her rig was unknown although her tonnage was 271 and her dimensions were 125 x 27 x 12 feet. She was a steam whaler of unknown horsepower, and the excellent recent book **Steam Whaling in the Western Artic** by John Bockstoce has her built in Astoria, Oregon. As a West Coast vessel, the **Alliance** was effectively eliminated.

Arnolda: The **Arnolda** was a 340-ton bark built in 1844 in Rochester, Massachusetts, that sailed out of San Francisco from 1886 through 1893. She was never registered in San Francisco but maintained her registry at New Bedford. Her dimensions nearly matched the King Street Ship in that she was 104.7 x 28.1 x 18 feet. Hare puts her in Oakland Creek in 1885, along with the **Bounding Billow,** the **Ocean,** the **Eliza,** the **Hunter,** the **Hildalgo,** the **Helen Mar,** and the **Sea Breeze** (Hare 1960: 83). But Hare gives no citation for any of his interesting material, and therefore we cannot be sure of the sources although they are apparently taken from the local press. There was simply no information on the **Arnolda** that we could find after 1893.

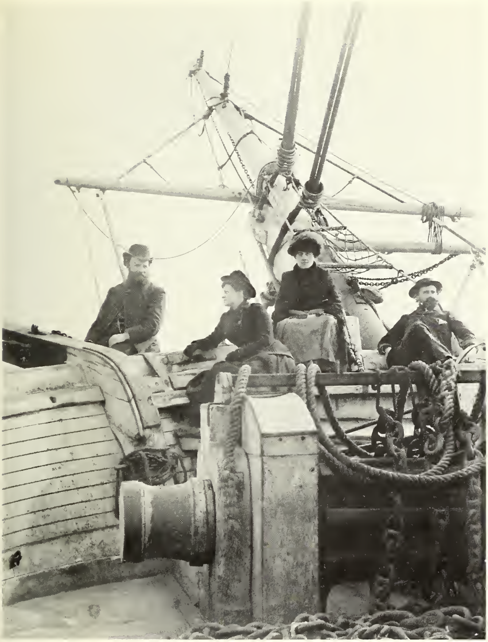
Bounding Billow: Built in Chelsea, Massachusetts, in 1854, the **Bounding Billow** was a prime candidate. Although Hare claimed that she "ended her sea career in the bone yard at California City on the Marin County shore" (Hare 1960: 110), again the information was not cited in a way or at a precise time so that it could be checked. The **Bounding Billow** was a bark measuring 239.7 tons and 119 x 27.5 x 12.2 feet. The 12.2-foot depth of hold would appear too little, but there was some question as to whether or not this measurement was sometimes to what one would ordinarily consider the 'tween decks. The lower hold measurement of the King Street Ship matched well with the **Bounding Billow**'s depth. She was sailing out of San Francisco from 1883 through 1893, and San Francisco was still listed as her home port in 1899, after which she is no longer listed in the **List of Merchant Vessels.** A note in the **Coast Seamen's Journal** of September 13, 1899, contained the information that the "old whaling bark **Bounding Billow** . . . has been purchased by Piper Aden, Goodall Company of San Francisco and will be cut down and turned into a barge for Bay Service." Notes such as this we took as less than conclusive. Figure 4.54 shows the **Bounding Billow** alongside the **Sophia Sutherland** in Oakland Creek. The **Sutherland,** a West Coast schooner, turned up outfitted for a voyage for the Nome gold rush in 1899, as did a lot of vessels that were unfit, laid up, or bought by operators who had intentions bolder than they publically admitted. The **Sophia Sutherland** herself turned up outfitted for a whaling voyage in 1900 and was lost in 1901. The **Bounding Billow** indeed became a barge, for a **Coast Seamen's Journal** note of 1905 remarked that the coal hulk **Carbon** (ex-**Bounding Billow**) was to be used as the foundation for a wing dam on a levee, we do not know where. But it was clear from the coal hulk note that she could not be the King Street Ship, for the salvaged midsection shows no trace of the pervasive coal dust that must have crept into the spaces between her timbers during this service.

Coral: Again the **Coral**'s dimensions were close to the King Street Ship: a bark of 362 tons, 109.1 x 27.9 x 18.2 feet, she was built in Newbury, Massachusetts, in 1819 and was sailing from San Francisco from 1878 through 1887. She is listed as "withdrawn" in 1888. Obviously, a vessel as old as the **Coral** which is described in 1884 in Hegarty as "in a leaking condition" and is not seen as sailing out any known port after 1887 might have been withdrawn from the **List of Merchant Vessels** because she was not seaworthy enough to pay taxes on, or to be licensed for use. Still, there was no sure way of knowing how or where the **Coral** ended her days. It was with some frustration that the researchers found a reference to the **Coral** in the **San Francisco Call** for November 7, 1889, in the files of the National Maritime Museum at San Francisco, only to find that the microfilm for this particular page (6) was missing from the Bancroft Library microfilm file, and the San Francisco Public Library file as well. This was because the libraries purchased their microfilm newspapers from the California State Library, and this page was never microfilmed. The **Chronicle** and the Examiner had no stories on the **Coral** during the week in question, so this reference must have been either an isolated item or a feature story that was never repeated in the other papers.

Dawn: The **Dawn** was an American bark that sailed from San Francisco from 1877 through 1885 when, like the **Coral**, she is listed as "withdrawn" in 1886. Built in 1857 in New York City she measured 260 tons, was 123.6 x 27.9 x 12 feet. The only information about her is contained in Hare's comment that Wright and Bowne and Company took over the shipping interests of Captain Thomas W. Williams in the early 1880s, with a fleet that included "Such well known barks as the **Bounding Billow, Coral, Dawn, Eliza, Francis Palmer** and the brig **Hidalgo** that carried their flags into the Arctic and Okhotsk Seas" (Hare 1960: 98). Again, the reference is vague as to the precise year and in no way accounts for the demise of the **Dawn.** The **Morning Call** of October 24, 1893, reported that the assets of the firm of Wright, Bowne and Company included the **Bounding Billow, Hidalgo, Stamboul,** the **Lydia**, and the **Bonanza.** There is no mention of the **Dawn** at this late date of 1893. Therefore, we are left with her last sailing date out of San Francisco as 1887 and no known end to the **Dawn.**

Francis Palmer: The American bark **Francis Palmer** was built in Robbinston, Maine, in 1852 and measured 210 tons. Her dimensions were 112.7 x 24.7 x 11.7 feet. She sailed out of San Francisco as early as 1879 and made yearly whaling voyages up until 1888. There is a note in the **San Francisco Call** of September 30, 1889, that "she will be broken up."

Hunter: An April 6, 1898, note in the **Coast Seamen's Journal** reported, "The Bark **Hunter** was towed out of Oakland Creek, California, on the first and taken across the bay to outfit for Alaska. The bark has been purchased by a Chicago company, of which Engineer A. C. Rumble is the local representative, and will be started North as soon as possible." The **Hunter** had been making whaling voyages out of San Francisco from 1889, according to Hegarty. Built in Bath, Maine in 1851, she measured 355 tons, 124 x 28.2 x 17.8 feet. San Francisco was listed as her registered port until 1898 when Chicago is her registered port--due to her change in ownership.



Figures 4.53 and 4.54: Laid-up Whalers Were Instant Nostalgia. . .In the 1880s in Oakland Creek whalers out of Herman Melville's day laid up between Arctic voyages--for San Francisco was now the home port of many a ship that still carried "New Bedford" on her stern. Here the photographers and their ladies pose on the bluff bows of the **Young Phoenix** in the course of a winter's day outing. The old **Bounding Billow** (right) and other laid-up ships drew a commercial photographer to the banks of Oakland Creek at the turn-of-the-century. (Bancroft Library; National Maritime Museum at San Francisco)

It was not at all unusual to bring out old whalers for the boom of the Klondike gold rush in 1897 through 1900. A note appears in the same journal on December 22, 1897: "Vacant lots on Spear Street, San Francisco, are being transformed into shipyards for the construction of vessels for the Alaskan trade in the spring. Three steamers and several barges will be built in sections and shipped to Oonalaska for the Alaskan Exploration Company." And again the journal noted in May of 1900, "Two queer looking crafts are at present in San Francisco destined for Cape Nome where they will be used as wharf-boats. They are rigged as topsail schooners and will leave for Nome in a few days." And on May 30, "Since the opening of the Nome Rush and up to May 26, forty-seven craft have left Seattle for Cape Nome carrying 7,216 passengers." In February of 1898, "from San Francisco to Orca, Copper River, Portage Bay and Valdes Pass the rate will be $100 . . ."(**Coast Seamen's Journal**).

On April 18 the old bark **Hunter** was worth $6,000 to a Seattle firm now named, "The Hunter Trading and Transportation Company." She sailed from Seattle to Cape Nome with a crowd of gold seekers but it was her last trip: "The schooner **Elipse** and the bark **Hunter** were crushed in the ice on their way from Dutch Harbor to Cape Nome. The crews were saved by the steamers **Valencia** and **Rainier.**" The **Hunter** was built in 1851 and the **Eclipse** in 1852. Thus, the **Hunter** was effectively eliminated from our list of possible candidates for the King Street Ship. What was important was that fact that ships of this age and class were being refitted for the Klondike gold rush at about the precise time our King Street Ship would have also been in the process of refitting. The fact that it was highly profitable to refit whalers for the gold seekers made the search for the identity of the ship even more probable. Needless to say the Klondike gold rush had many side effects on the whalers in San Francisco: "Whalers are finding it hard to secure crews in San Francisco, and the crimps are advertising for men, under the pretense that by shipping in a whaler they can desert on Kotzebue Sound, and thus secure a free passage to the gold regions. As the whalers do not call at the Sound, but go straight to Point Barrow the men thus shipped will find themselves shanghaied," so warned the **Coast Seamen's Journal** on March 9, 1898.

Mars: The **Mars** was sailing out of San Francisco as early as 1884 with her port of registry still listed as New Bedford. Built in 1823 in Boston, she was a bark of 256 tons, 95.4 x 25.7 x 17.2 feet. She was making whaling voyages out of San Francisco until 1893. There is a reference to her in the files at the National Maritime Museum at San Francisco as the subject of an article in the San Francisco **Call** on December 3, 1893. Again, we find the microfilm missing from both the Bancroft Library and the San Francisco Public Library. Considering her age, it may well have been the description of her final voyage or some circumstances surrounding her withdrawal from sea voyages. Research time did not permit us to pursue this candidate through other papers at the same time, nor did the **Coast Seamen's Journal** weekly column make any note of the **Mars** that we could find.

Page: The **Page** was the smallest of the vessels used as a whaler in our list of King Street Ship candidates, and from this standpoint she was the least likely to match the dimensions projected for our vessel. Built in Barnstable, Massachusetts, in 1831, she sailed out of San Francisco as a whaler from 1883 to 1887. She measured 110 tons and was 81 x 23.6 x 10 feet. Hare remarks, "The schooner **Page** was an early venture sent out by Wright. (Shed & Wright were codfishers, fur traders, and whalers from San Francisco.) The little vessel passed into the control of Taylor and Bendel, who engaged her in whaling and the fur trade between San Francisco and Sitka. Taylor and Bendel were importers of wines and liquors . . . sole agents for Dr. Hudeland's Swiss Stomach Bitters. It was hinted on the waterfront that a connection existed between the fur and liquor trade. A few merchants, and an occasional whaleman 'legger' were accused of smuggling liquor to the natives under the guise of fishing, trading and whaling voyages" (Hare 1964: 41-42). The only comment about her condition was a note in Hegarty that on her 1884 voyage, she "arrived in distress." We find her "withdrawn" after 1888, and no information has so far turned up to indicate how the New England-built schooner met her end.

Stamboul: For a while the **Stamboul** appeared to be a prime candidate. She was a bark built in 1843 in New Bedford, and measuring 260 tons; she was 106.2 x 25 x 14.5 feet. She appears to have sailed out of San Francisco from 1883 until her last listed voyage in October of 1893. She was still registered in San Francisco in 1894, but after that never again. There was no information as to how she met her end. Karl Kortum of the National Maritime Museum at San Francisco believes that the sheer hulk alongside Mathew Turner's shipyard at Benicia, around and after the turn of the century, was the rigged-down whaler **Stamboul.** A photo of the yard taken during the World War I wooden ship-building boom suggests that the hulk sank in that spot and part of the wharf was extended over her. A newspaper sketch undated and without any accompanying story located by Kortum in a scrapbook shows the **Stamboul** with the legend, "The whaler **Stamboul** Waiting to be Broken Up." As we have found in tracing some of these newspaper references, announcements of the intended fate of vessels was by no means always a reliable guide to final actions taken.

Thomas Pope: Built in Mattapoisett, Massachusetts, in 1856, the **Thomas Pope** was a bark that measured 227 tons, 106.2 x 25 x 14.5 feet, and she sailed from San Francisco from 1881 through 1886, although she maintained her New Bedford registration. A note in the **Call** of September 7, 1890, reports that the **Thomas Pope** was wrecked off Point Hope. Captain Haveside of the schooner **Oscar & Hattie** brought the news on the twentieth of August. The **Thomas Pope** had been acting as a tender to the whaling fleet at the time she sank. Her last voyage listed in Hegarty is 1887, but she must have made at least one more voyage north with provisions and supplies before her end. The note cited above in the **Call** effectively removed the **Thomas Pope** from our list of candidates.

Thus, the number of possible vessels had dropped from 64 whalers to 16, and then to 12. Of those 12, there remained the **Arnolda,** for whom no decisive end could be located, the **Coral** (with the missing microfilm reference), the **Dawn,** the **Hunter**, possibly the **Page** (although her measurements were smaller than the projections) and the **Lydia** (discussed below). In addition to these whalers there were the other vessels that might match our suspected vessel, such as the brig **Tanner** and the barkentine **Fremont.**

Several other candidates appeared that were not listed in Hegarty's **Returns of the Whaling Vessels Sailing from American Ports,** such as the

Mary D. Hume, a steam-whaler that went through a variety of metamorphoses. In October of 1899 the **Coast Seamen's Journal** bore the note, "The old steamwhaler **Mary D. Hume** will be turned into a cannery-tender and will go to Bristol Bay next year with the salmon fleet." In March the same journal reported, "The old whaler **Mary D. Hume** has been turned into a tugboat. The **Hume** will go from San Francisco to Nome about the end of March, and on her arrival there will carry passengers between St. Michael and the new gold-fields for the Pacific Steam Whaling Company . . . Great rivalry exists among the whalers as to which will be the first to land freight and passengers at Cape Nome. The **Jeanette** and the **Mary D. Hume** left last Sunday--heading for Nome" (**Coast Seamen's Journal,** March 14, 1900). A further check revealed that the **Mary D. Hume** was built at Ellenburgh, Oregon, as a "schooner-rigged auxiliary steamer in use in their experiment in wintering at Herschel Island. . . . Today, her hull ninety-five years old, she works as a tug in Puget Sound" (Bockstoce 1977: 99).

Such tantilizing items as this note in the **Coast Seamen's Journal** were enough to start additional searching for the identity of the King Street Ship: "The old whaling bark **Mermaid,** which was taken out of Oakland Creek and made a trip last spring to Kotzebue Sound with gold hunters, was sold at auction at San Francisco on the 7th. B. H. Madison bought her for $1,250 and will probably send her back to Oakland Creek for the present (**Coast Seamen's Journal,** December 14, 1898). Considered a total loss in November of 1899, in Dutch Harbor, Alaska, she was "sold to Captain White for $400." And finally, "The hull of the bark **Mermaid** was burned for junk at Port Blakely, Washington. The **Mermaid** was said to have been the oldest vessel on the coast, having been built on the Atlantic coast 64 years ago." Thus the **Mermaid,** who never made Hegarty's list, became a candidate until substantial evidence finished her in Port Blakeley, Washington, on June 12, 1901.

The **Morning Star** was still another possibility considered for the King Street Ship. This was complicated by the fact that there were **two Morning Stars**--both involved in whaling, both East Coast-built. One **Morning Star** (1671 H.N.D.S.) was built as a bark of 230 tons, 104.6 x 25.6 x 15.1 feet. Built in Dartmouth in 1853, she was still registered in New Bedford in 1900. Another **Morning Star,** later the **Herman,** was built in Bath, Maine, in 1884, as a barkentine of 471 tons, later 410, with dimensions 131.3 x 29.9 x 12.2 feet. References in the **Coast Seamen's Journal** and the newspapers did not make it clear which **Morning Star** was under discussion. This note appeared in March of 1900 (referring to the larger and newer vessel): "The Barkentine **Morning Star,** lately sold to Lewis, Anderson and Company and Captain Sherman and others has been sold by them to Liebes & Company who will put the vessel in Nome trade." In April of the same year the journal noted, "It is now charged that the reason why the Missionary Society disposed of the barkentine **Morning Star** was because they considered her not sound and safe enough for South Sea Island Routes." And in November of 1903, the note appears, "Death claimed the first and fourth officers of the whaling schooner **Morning Star,** which arrived at San Francisco on November 9, from a blubber hunting cruise. . . . The **Morning Star,** which was formerly engaged in missionary work in the South Seas, brought 3,000 pounds of bone, 2,100 fox skins, 30 bear skins, and 500 pounds of ivory" (**Coast Seamen's Journal,** November 11, 1903). It became doubtful that the whaling bark of Dartmouth, built in 1853, ever sailed from San Francisco, and it was apparent that the **Morning Star** of Bath, 1884, was too beamy for our King Street Ship.

A number of other vessels held the researchers interest from time to time, such as the brig **Pitcairn,** also an ex-missionary brig that was put into the Nome trade in 1900--but she was built in Benicia in 1890. The possibility of the King Street Ship being a government-built vessel of some sort, possibly a revenue cutter, was considered--but those pursued proved to be West Coast-built, like the **Richard Rush,** and the **Corwin.** The revenue cutters were in constant service in the Arctic with the whalers: "It is stated that the United States revenue cutter **Grant** will leave Seattle, Washington, in a few days for a four months cruise in the North, the object being to keep track of the whalers in order to render assistance if necessary" (**Coast Seamen's Journal,** November 9, 1898). And of course there were the numerous stories of the heroic **Bear.** "Eight whalers are imprisoned in the Arctic ice in the vicinity of Herschel Island. Their crews number three hundred men, and it is feared they will starve before help reaches them. The authorities in Washington, D. C., say that nothing can be done for the distressed men until early next spring, when the revenue cutter **Bear** will be sent up well provisioned" (**Coast Seamen's Journal** November 3, 1897).

TYPES OF WHALERS AND THE IMPORTANCE OF THE ARCTIC FISHERY

While construction features of the King Street Ship identified it as an old type of ship, the small length and depth of the section recovered from the initial sewer excavation gave little direct evidence as to the design of the vessel, except in one conspicuous element. The deadrise--i.e., the slope of the bottom from the turn of the bilge to the keel--was considerable. This angle of about 15 degrees caused some maritime consultants to speculate that the vessel might have been built as a government vessel--for the Revenue Marine, for instance--or as a whaler. Other vessels built for services that did not place the highest premium on cargo-carrying capacity might in any given instance have substantial deadrise.

But while definition of the vessel as East Coast-built, three hundred tons or so, and built no later than the 1860s did not by any means rigorously limit the amount of deadrise that might, for one reason or another, exist in a variety of vessels built for different purposes, "whaler" struck a strong chord. At San Francisco near the turn of the century, the largest specific class of old East Coast vessels that would be expected to show substantial deadrise were whalers. A smart deadrise contributed to an easy motion at sea and produced the right sort of stability curve when the vessel was hove down under the weight of hoisting aboard such monstrous objects as the head of the bowhead whale. Again, whalers as a class were the oldest seagoing vessels regularly sailing out of San Francisco around 1900. Laid up in Oakland Creek or other shallow estuaries when prices of oil and balleen were low, they were refitted for sea when the conditions of this highly speculative business appeared attractive.

The mid-sections of five whalers are shown drawn to the same scale in Figure 4.55. The old **Charles W. Morgan** (see Figure 4.56), now a museum ship at Mystic Seaport, and the only American merchant vessel of her age and size still intact, shows a deadrise of 18 degrees. The **Morgan** is seen in Figure 4.57 on the floating drydock at the Spear Street Wharf in San Francisco, freshly coppered and ready for another cruise out of her home-port-away-from-home.

This photograph from the stern at keel block level tends visually to exaggerate the deadrise. The shape will be seen to conform to the section in Figure 4.55 if one sights down the port side between the scaffolding and the keel. The long and easy curve of the bilge is even more apparent. A more typical section of a merchant ship, whether of the 1840s or of the 1860s, would show not only less deadrise, but a sharper curve at the bilge--a configuration tending more toward the shape of a box than that of a barrel.

The "whaler theory" did not change the direction of research involved in the "seawall theory" of the probable period of the vessel's abandonment at the foot of King Street--but it did suggest particular attention to the nature and activities of the whaling fleet around the turn of the century. Whaling and whalers, to a lesser extent only than clipper ships, have been favored by the attention of capable researchers and writers and the subject well documented in easily available works. The very nature of the industry resulted in convenient records of voyages. If the bones of a suspected American whaling bark were uncovered in the sands of a Brazilian beach, her identity probably could be established quickly enough, as such terminations of voyages were recorded as carefully as homecomings. But the King Street vessel, if a whaler, was not on a whaling voyage when she was lost or abandoned. She was through with whaling, or was outfitting for a voyage, whaling or otherwise. She was lost in some waterfront accident, a class of information (in the case of an old and not especially newsworthy vessel) found in the local press rather than in lists and histories.

Unfortunately, the midsection shape could not establish whether the whaler was of the older type, such as the **Charles W. Morgan,** or the "clipper" type developed in the early 1850s. William A. Baker points out in his essay on the development of the Arctic steam whalers that "during the peak of the clipper ship era, say 1850-1853, almost every ship that loaded for California was advertised as at least a half-clipper" (Bockstoce 1977: 64). The same phenomenon may be observed in San Francisco newspaper advertisements of the period--though we do not recall examples of vessels, however ordinary, being described as mere "half-clippers".

In the design of whalers, the clipper enthusiasm resulted in new vessels having much sharper waterlines forward (the run of the typical whaler was already quite fine) and a raking stem. As this clipper model

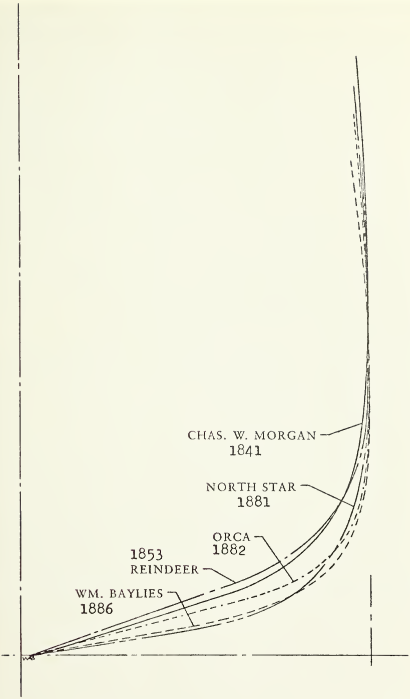


FIGURE 4.55
COMPARATIVE MIDSECTIONS OF
THREE SAILING AND TWO STEAM WHALERS

COMPILED BY WILLIAM BAKER

Figure 4.55: Comparative Midsection Drawing. . .of nineteenth-century sailing and steam whalers. (Janice Narita Pastron from William Baker in Bockstoce 1977)

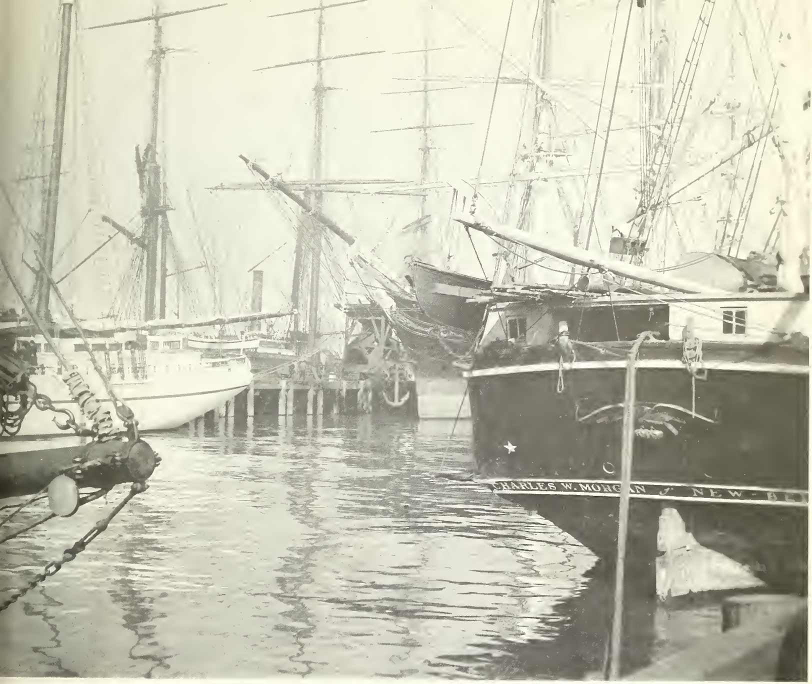


Figure 4.56: Along the Waterfront. . . The old whaler **Charles W. Morgan** turns up in this classic photograph of San Francisco's turn-of-the-century waterfront. Though she had been sailing out of San Francisco for years, the **Morgan** still carried "New Bedford" on her stern as home port. (Author's collection)

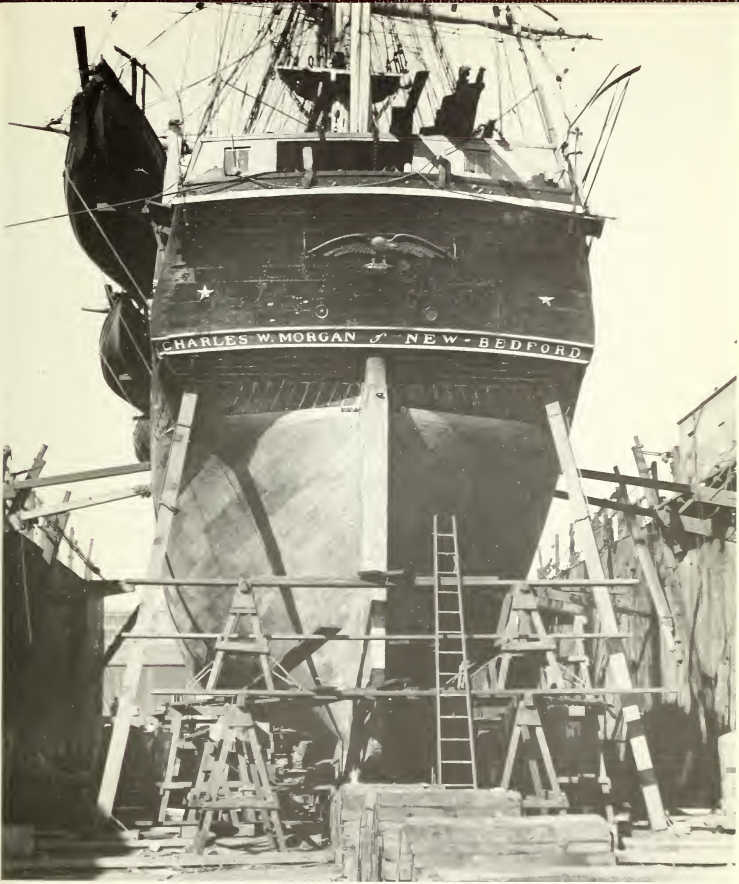


Figure 4.57: The Morgan at Keel Block Level. . .On the drydock at the foot of Spear Street in San Francisco, the **Charles W. Morgan** shows the comparatively sharp deadrise that suggested that the King Street vessel might be a whaler. The stern of the **Morgan** from this angle also gives a good impression of the intact portion of the vessel lying to the south of the King Street sewer. (Bancroft Library)

persisted through the rest of the period during which sailing whalers were built (see the lines of the bark **William Baylies** of 1886 in Bockstoce's account), it would appear that it did no harm. Certainly there was no painful tradeoff between extra speed as against loss in the carrying capacity/cost ratio, as neither quality was critical in a sailing whaler. Baker and others mention the contemporary claim that the sharper bows and raking stems facilitated navigation in light ice; again, it would seem that the advantage may have been real but marginal. As the Arctic whale fishery opened up after 1848, sailing whalers of the old, bluff-bowed sort made the same voyages north of the Bering Straits as the newer vessels.

Thus, while knowledge as to shape of the rest of the King Street vessel, particularly forward, would have been useful in determining her type and probable age, the strong possibility that she was a whaler that was active, or only recently laid up, around 1900-1903 was no clue as to her age. The **Charles W. Morgan,** built in 1841, sailed out of San Francisco for the Arctic during these years--and she was not the senior vessel of her class. For instance, the **Mars,** built in 1825 in Boston, was laid up in the mid-1890s, and the **Coral,** built in Boston in 1819, may or may not have been broken up in Oakland Creek in 1889-90.

San Francisco as a Whaling Port

Although the history of whaling out of San Francisco has not been recorded in sufficient breadth, depth, or detail to suit the desires of specialists in West Coast maritime history, the published material is sufficiently extensive to make any lengthy summary in this report superfluous. Lloyd C. M. Hare's **Salted Tories; The Story of the Whaling Fleets of San Francisco** (Marine Historical Association, Mystic, Connecticut, 1960) addresses the subject in a monograph of 114 pages. It is a solid piece of work, but suffers not merely from absence of bibliography or annotation, but an unusual avoidance of internal source references.

Robert Edward Leet's excellent master's thesis, "American Whalers in the Western Arctic: 1879-1914" (ms., University of San Francisco, 1974), chose 1879 as the starting point for an examination of the San Francisco whaling industry, as this was the year of the first **Mary and Helen**--the prototype of the steam whalers designed and built for the specialized requirements of whaling in the Arctic Ocean. As Leet comments:

> The age of the steam whaler had arrived, and with it the end of an era. . . . The success of the **Mary and Helen** awakened West Coast entrepreneurs to the profits which could be garnered from the pursuit of the whale. In the opening years of the 1880's the Pacific Steam Whaling Company was organized to insure that those profits would remain in San Francisco. The City by the Bay was assured her short-lived preeminence as America's whaling port (17-18).

John R. Bockstoce's magnificently illustrated **Steam Whaling in the Western Arctic** (Old Dartmouth Historical Society, 1977) follows up Leet not only as an improved monograph, but with the addition of sections on the design and construction of steam whalers (by William A. Baker), individual (and illustrated) biographies of the steam and other powered whalers of the Arctic fishery, and a list of the "wintering" voyages (1850-1910)--these last a development primarily of the 1890s and the steam whaler capability, in which the whaleships deliberately laid up in the ice at the onset of winter so as to operate much further to the east of Point Barrow than could be done in a single short season's penetration and return.

These three major works devoted to whaling out of San Francisco, however, leave more to be desired from the standpoint of detailing the activities of the old sailing whalers, the first bereft of source references, the latter two concentrating mainly on the steam whalers and entirely on the Arctic Ocean fishery.

Honolulu, San Francisco, and the Arctic Ocean: The reason that the history of San Francisco as a whaling port is best described with regard to the steam whalers and the bowhead fishery of the deep Arctic is that these two developments were the most conspicuous features associated with changes in a declining American industry that experienced its last period of notable profitability with San Francisco as the effective (if not technical) home port of the most successful part of the fleet.

The huge Massachusetts-based industry of the 1820s, '30s, and '40s was bigger than ever in the 1850s. In one of the peak years of the fishery, 1853, American whalers brought home over 3 million gallons of sperm oil, more than 8 million gallons of whale oil (other than sperm), and the all-time record of over 5.75 million pounds of whalebone, for a total catch valued at a little over $10.75 million. The whaling fleet in that year consisted of 602 ships and barks and 66 brigs and schooners; of these, the vessels returning to port in 1853, with the cargoes listed above, were 198 ships and barks and 53 schooners and brigs (Starbuck 1964: 660-702).

An instructive, though somewhat novel, commentary on the size of the whale fishery may be drawn by some comparisons with the economics of San Francisco at that time. The 198 ships and barks that returned to New Bedford, Nantucket, and the other whaling ports in 1853 were nearly half the total number of ship arrivals at San Francisco in that year, when the California mines produced over $60 million in gold. Most of those 1853 whaling arrivals had sailed in 1849 and 1850, at the height of the California gold fever. Around 36,000 people sailed to California in 1850 to join the Gold Rush; the crews of the whalers that sailed that year probably totaled 8,000 or more, and the number of American whaling men at sea in 1850 was probably not less than 20,000 (Starbuck, Ibid.; Hittell 1878: passim).

No, whaling in the early 1850s was not as big an operation as the California Gold Rush--but the figures and estimates above give a startling impression as to how large the American whaling industry was at its peak. In this period, the Pacific was the most important of the world-wide whaling grounds, with the sperm fishery extending across the ocean from the Tropic of Cancer to the Tropic of Capricorn, and with the bowhead fishery in the North Pacific extending into the Sea of Okhoskt, the Bering Sea, and into the Arctic Ocean. Honolulu was the major port for "recruiting"--stopping over for needed resupply during three and four-year voyages. J. S. Hittell, writing in 1882, gave a good summary of the operations of the industry in the Pacific, and the change that was taking place:

> The whalers in the North Pacific continued to increase until 1855, when they had reached the number of 500, and nearly all had their ports of rendezvous and refitting in the Hawaiian Islands. Honolulu was the favored port for 200, and Lahaina for a greater number. In 1854 the catch of 525 whalers included 60,000 barrels of whale and sperm oil, and 700 tons of bone. Once in 4 years each vessel returned to her home port, which, for most of them, was New Bedford; and the sailors who had managed to economize their shares often

obtained enough on a single cruise to enable them to acquire a comfortable home. After 1855 there was a gradual decrease in the number, until the beginning of the Civil War, which occurred at the time when the large supply of petroleum began to supersede whale and sperm oil for illuminating and lubricating purposes. Most of the whalers in the North Pacific were then withdrawn from the business. Of those which remained in 1865, the rebel cruiser **Shenandoah** burned 34; and in 1871, 32, and in 1876, 14 were lost in the ice of the Arctic. The whalers continued to rendezvous in the Hawaiian Islands till 1865, when they began to come to San Francisco, where supplies could be obtained as cheaply as in Honolulu. One of the motives of the change was, that the Hawaiian Government would not allow a whaling vessel to carry a native of the islands away, without giving a bond in the sum of $600 for his return. Now, all winter in San Francisco, where 6 of the scanty fleet of the North Pacific, consisting, in 1882, of 40 vessels, are owned. . . .

The whales have become scarce and wild, and must be chased into the ice, where twice within the last 10 years considerable portions of the whaling fleet were lost. It is true that California is not adding much to the number of her vessels engaged in this chase; but while she occupies a nearly stationary condition, Massachusetts has for the last quarter of a century been rapidly retrograding, for she has not now one third so many vessels in the whale fishery as she had in 1855.

In 1882, the North Pacific whaling fleet consists of about 40 vessels, of which 4 are steamers. San Francisco owns one of the steamers, and 5 of the sailing-vessels, the others belonging to New Bedford. The use of steamers is new; the first cruise of a steam-whaler from San Francisco having been made in 1880.

The catch of the whaling fleet in 1881 included 354,000 pounds of whalebone, worth from $2.20 to $2.50; 15,000 pounds of ivory, worth 60 cents; and 21,000 barrels of oil, worth from 34-1/2 to 35 cents a gallon. Allowing $850,000 for the bone, $280,000 for the oil, and $9,000 for the ivory, we have a total of $1,139,000 for the season's work; an average of $57,000 for a vessel. Some of them, however, made over $75,000, while others did not make $30,000. In 1855, when sperm-oil was worth $1.75 per gallon, whale-oil 70 cents, and bone 45 cents, the average catch of the whalers in the North Pacific was about $38,000 to the ship. The highest average price for the year of sperm-oil was in 1866, when it rose to $2.55; of whale-oil in 1866, when it was $1.45; and of bone in 1880, the price being $2. The common rate of annual interest, on loans secured by mortgage of whaling vessels is 16 percent, and the rate of insurance for the season is 15 percent.

The whalers sent out from San Francisco vary in value, including all supplies for a voyage, from $15,000 to $40,000 each. A whaler has usually 3, 4, or 5 boats, with 7 men for

> each boat, and from 5 to 10 extra men, including cook, steward, carpenter, and cooper. In a trip to the Arctic, a whaler usually spends 35 days in her northward and 20 in her southward trip, and has 7 months for work on the whaling ground. Sometimes she will get as much oil as she can carry before reaching the Bering Strait, but this has become a rare piece of good fortune, and the chief field of occupation and profit is now beyond the strait, near the domain of perpetual ice.
>
> The officers and crew of whaling vessels do not receive a fixed sum by the month or voyage, but are engaged, "on the lay" or share. The common rule is that the owners are to supply the ship, boats, implements, and provisions, and are to receive 60 per cent of the gross proceeds, leaving 40 percent to be divided among the officers and crew. The captain usually gets about one twelfth, a mate one twentieth, and the ordinary seaman the one hundred and eightieth part. A good catch is often worth $45,000; of which sum the owners would receive $30,000, the captain $3,750, each mate $2,250, and each sailor $250. The rewards are high for the captains and mates, and the men have $30 a month. The possibilities of much higher profit, and the interest of the crew in the catch, help to secure men for whalers at times when merchant vessels can not obtain skillful sailors.
>
> The whaling of the North Pacific is now exclusively in the hands of the Americans, and all or nearly all the vessels make up their crews and discharge their cargoes in San Francisco (Hittell 1882: 346-347).

Sailing Out of San Francisco

We will not here describe the minor whale fishery conducted out of San Francisco in vessels owned at San Francisco, which began as early as 1851, when the Gold Rush had barely simmered down enough to get crews to put to sea. Starbuck shows many years, through the end of his list in 1878, when no whaling returns were reported for San Francisco.

The swift growth to dominance of steam whaling, in new vessels built both in the East and San Francisco in the early 1880s, was the major factor in the shift of the most profitable segment of the business to San Francisco. Bockstoce writes, "But for the American fishery as a whole, the most important event of 1883 was the incorporation of the Pacific Steam Whaling Company, an event that would lead to the domination of the industry by west coast interests and bring about a surge of innovation in its practices. . . . Along with the incorporation of the Pacific Steam

Whaling Company, the same partners established the Arctic Oil Works, the first refinery for oil and baleen on the west coast, which was capitalized at $1,000,000. (Josiah Nickerson) Knowles was appointed manager of both the Oil Works and the Company, and under his direction the two enterprises provided for all the basic processes from catching to refining in what was essentially one organization" (Bockstoce 1977: 29).

The importance of the steam whalers has somewhat obscured the role of the old sailing whalers. As Hittell mentioned above, in 1882 there were 4 steamers out of a fleet of 40 vessels. Most of the other 36 were what we might call classic New Bedford-type sailing whalers that had already moved to San Francisco as a more or less permanent operational home. While new steamers came out of the shipyards during the '80s, and while the steamers (really auxiliary steamers, as they used sail for passage-making) were what the economists might call the profitable units in the industry, sailing whalers continued to transfer out to San Francisco during the '80s. Whaling still had some of the characteristics of placer mining; a steam whaler could have a losing season, while some old bark could return loaded with oil and baleen. A sailing whaler in good condition could be bought for a fraction of the cost of building a new steam whaler, and operating expenses for a voyage were lower.

With the Arctic and whalebone the particular objectives, the operation of the sailing whalers out of San Francisco was different than it had been out of New Bedford and her sister ports. The Hittell description quoted above makes it sound as though the sailing whalers headed directly out of San Francisco for the Arctic and returned, spending about seven months on the ground. Indeed, out of San Francisco whaling was now a seasonal affair--not a three or four-year globe-girdling voyage. However, the Arctic Ocean beyond the Bering Straits was a late summer cruising ground, there being litle time between the opening of adequate leads through the ice pack toward Point Barrow and the inexorable freeze of early fall.

So while the baleen of the Arctic bowhead whale was the major prize, the sailing whalers, with their low cruising costs, could afford to set off early--say, December 1--sail to the North Equatorial regions for still valuable sperm, turn northward to the Japanese grounds, and make the Bering Sea about the time the steam whalers would be heading north. Forced out of the northern regions in September, they would be back at San Francisco around the end of October. Thus, many cruises were more like eleven months than the seven Hittell suggested. The Sea of Ohkostk was an alternative ground to the Bering Sea and the Arctic.

Until well past 1900 there was still opportunity to be seen in the eye of some ship owner or master in outfitting an old bark for yet another cruise. Old whalers might be laid up for a season or two--or more--in the quiet waters of Oakland Creek, only to be outfitted once again when the price of whalebone was up.

The survivors of dangerous seasons in the Arctic (or the ship breakers of San Francisco Bay) were not many, but they outlasted the profits of the Arctic fishery. The **Charles W. Morgan** sailed from San Francisco on November 25, 1904, on her thirtieth whaling voyage. But this time her orders were not to return to the port she had made home since 1887, but to the port still emblazoned on her stern--New Bedford. A few other survivors returned in the same manner, such as the bark **Wanderer,** eventually lost at the outset of a whaling cruise from New Bedford in 1924. But of those not lost in the Arctic ice, more just quietly disappeared around San Francisco Bay than made it home.

On June 18, as this report neared completion, it was with some frustration that the Principal Historical Investigator again went over the latest and closest measurements derived from analysis of the first excavation of the vessel, the photogrammetric studies made before the section of the hull was removed, many careful examinations of that removed section by diversely knowledgeable maritime authorities, plus the additional measurements made at the recent 1980 test excavation. It was the final opinion that of all the possible candidates remaining, the measurements of the whaler **Lydia** came the closest to matching those of the King Street ship. And yet there was no proof.

It had been an almost casual decision for the historical consultants to invest another morning and another roll of dimes to copy the "Pacific Coast Marine" columns from the **Coast Seamen's Journal,** this time for the years 1895 and 1907--extending the reach a little further in time for the story of "the old ________ that was beached when she burned at the foot of King Street." And on the evening of June 18, another 104 xeroxed columns were gone over for that same elusive story. In the week dated April 10, 1907, this item appeared:

> The old whaling bark **Lydia** which has lain near the old Pacific Mail Dock, in San Francisco, for a long time, has been destroyed. The **Lydia,** built in 1840 at Rochester, Massachusetts, and under the command of old-time Yankee skippers out of New Bedford has pursued whales in every sea.

The afternoon's decision that the King Street Ship had to be the **Lydia** was followed by the evening's lucky near-proof. Yet even with this knowledge, it took the principal researchers several hours the next day to run down the daily newspaper stories that would be totally convincing--or not. Oddly enough, the persistent reporter of the daily column of the **San Francisco Examiner** "On the Waterfront--" never mentioned the **Lydia**'s "destruction." But the **San Francisco Chronicle,** which did **not** run a daily waterfront feature story, carried this news story:

> The old whaling bark **Lydia** has finally disappeared from the face of the earth. She disappeared from the sea many years ago, and with stern inbedded in the mud and bow high in the air has lain near the old Pacific Mail Dock apparently impervious to wind and weather. Her stout oak frames, held together by copper spikes, have defied time and the elements

> while other ships, built after she became old, have spent their brief age and slipped into oblivion, through accident or decrepitude.
>
> But now the **Lydia** is no more. Men with heavy sledges yesterday completed her destruction after pounding on the old hulk for days. The **Lydia** was built in 1840 at Rochester Massachusetts, and under the command of old-time Yankee skippers out of New Bedford has pursued whales in every sea (**Chronicle,** March 28, 1907).

"With stern inbedded in the mud and bow high in the air"--this striking image recalled a comment made by Maritime Consultant Aker just a few weeks earlier, while he was working up the site plan of the vessel. Having ascertained that the mainmast step had been in the section of the vessel removed from the sewer, and projecting the horizontal angle of the keelson, he speculated that the bow would have extended high above not only the high tide line but the ground level. At that time, this seemed only theoretical, although correct if the bows were intact at the time she was abandoned. However, we had assumed from the fire evidence that this physical condition never had been the actual case, the fire having burned the bows down to somewhere around the high tide line. As mentioned earlier, while the evidence of fire was very clear from such observations as the charred section of a spar, there were not enough undisturbed portions of the upper edge of the vessel on the north edge of the sewer excavation to demonstrate clearly the extent of fire damage.

There is nothing at all inconsistent with the original theory that the vessel may have caught fire at a nearby pier and been towed to this safe and unused location, and the case of the bow remaining largely (or totally) unburned. In the location behind the seawall, near the Pacific Mail Dock, fire equipment may have doused the flames. Alternatively, the fire damage may have been associated with the demolition of the vessel to the level of the surrounding fill. Only excavation of the forward section of the ship will show what happened.

At this point it may be well to expand somewhat on the sequence of landfilling in the area immediately around the ship, a topic examined earlier in this chapter in our discussion of the 1980 archaeological excavations. At that point we noted the railroad spur which ran down King Street in 1906 on its way to Pier 42. The course of the spur line led it directly across the location of the hull of the ship, then southward onto the sliver of property wedged between King Street and the Embarcadero. A careful plotting of the position of the vessel with respect to the lay of the track indicates that the spur line would have passed over the southern and western portions of the vessel. Because of her eastward tilt, following the slope of the bay bottom, the southern portions were at an elevation slightly **below** City Base, or slightly lower than the level of the track bed (see Figure 3.34). Hence the rail line could pass directly over the stern section of the ship, without any alterations to the hulk being necessary. Since the hull descends to the south, filling would have been necessary over the southern portions of the hulk.

By contrast, the protruding bow and forward portions of the hull would have formed an impassable obstacle to the use of King Street, once it was filled. Precisely when this filling took place is unknown, but that it was sometime during 1907 is suggested by the **Chronicle** article just cited. It seems likely that the work reported by the **Chronicle** was undertaken to demolish the protruding portions of the vessel near the center of the street. It was necessary to reduce their height to a foot or two below City Base in order that King Street could be finished to grade and serve as a thoroughfare. The southern, stern sections of the ship, already below City Base and crossed by the trackbed of the spur line, were left untouched. Thus for a period, it seems, trains rumbling down King Street on their way to Pier 42 must have practically brushed the remains of the **Lydia** before the men with sledges did their job in 1907.

With the **Lydia** positively identified, the historical researchers turned first to an earlier clipping from the **Coast Seamen's Journal** regarding the end of the **Lydia**'s days as a whaler (see Figures 4.58 and 4.59):

> The whaling bark **Lydia** has been sold by G. W. Hendry to the Pacific Coast Wrecking Company of San Francisco, and will be converted into a barge. The **Lydia** was built at Rochester, Massachusetts, in 1840 (**Coast Seamen's Journal,** May 29, 1901).

Checking this story back to the daily press, two stories were found:

> The old whaling bark **Lydia,** which made fortunes for her owners, was towed up to the bulkhead at Howard Wharf Number 3 this morning to be dismantled by the Pacific Coast Wrecking Company. This, as well as many of the other antique barks that have been chasing whales for the last half century, was forced out of business by the advent of steam schooners

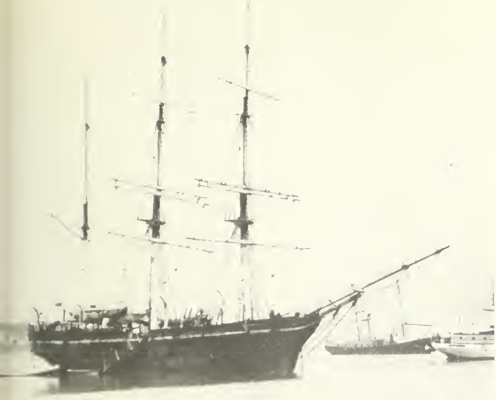


Figure 4.58a and 4.58b: Lodgings in Oakland Creek. . .The quiet waters of the Oakland Estuary were the ideal spot to lay up a ship for a season or more. With the **Lydia** in this view are a big Downeast bark (right) and a white-hulled brigantine with an out-sized after deckhouse that may be a South Seas trader. (Peabody Museum of Salem)

> in the northern waters. The **Lydia**'s hull will in all likelihood be used for moving coal about the harbor (**Examiner**, May 25, 1901).

This "Along the Waterfront--" column was headed **"Rush to the Gold Fields"** and started with the note: "The season's rush to Nome and other Alaskan coast mining camps begins tomorrow with the sailing of the steamers **Portland, Valencia,** and **Ruth.** These steamers will take up about 400 miners to the gold fields, and will be followed by the **Senator,** which sails Thursday. . . ." We mention this because the continued references to the need for additional adequate, and sometimes much less than adequate, passage to the gold fields may have some relevance to what the **Lydia** was actually used for in 1901. The physical evidence of the **Lydia,** both from the sewer excavation and the test excavation, is exactly the opposite of the possibility of the **Lydia** being used as a coal hulk. Most dramatically, there is no sign whatsoever of pervasive black stuff in any part of her hull, in any crevice, between any joints, or in her standing ballast.

A feature story gave some of her history in the **San Francisco Call** of the same week in 1901:

> **Last of the Whaler Lydia**
>
> The old whaler **Lydia** is to be broken up. Built in Rochester, Massachusetts, away back in 1840, she is known from Maine to California, and there are few of that 'old brigade' of whalemen who have not served on her at one time or another. In her young days she was the pride of the New Bedford fleet and chased the sperm whale all over the Southern Seas. In Austrailasian waters she made some good catches and many a thousand pounds of 'bone' has she brought home from the Artic. On this coast the **Lydia** was never a success and many a time she was fitted out by Wright, Bowne & Company only to come back clean after a year's absence.
>
> In 1893 she made her last voyage for that firm. The next year she was not sent north, but in 1895, a party of young men sent her north, but all they gained was experience. In 1896, C. J. Hendry & Son, the ship chandlers, fitted her out, but they could not make her pay out, and she was laid up in Oakland Creek, and has been there ever since. A couple of days ago, the old bark was sold to the Pacific Coast Wrecking Company, so that after almost sixty years of constant service, the **Lydia** has gone to the 'bone yard' at last (**Call,** May 25, 1901).

The Pacific Coast Wrecking Company may have taken her to Howard Wharf Number 3 (as described in the **Examiner** story of the same date) and "dismantled" her. But "dismantled" to what extent? And to what purpose? The test excavation shows the vessel to have what appears to be new chain plates. Something happened to the **Lydia** between the time she was taken to Howard Wharf Number 3 and the time she wound up in the Pacific Mail Basin, something that had to do with installing new chain plates and new sheathing. It would appear that she was being outfitted immediately before her abandonment, not dismantled.

Was she being outfitted for the gold rush, like the old whaler **Northern Light**? The **Northern Light,** a whaler built in 1851, in Rochester, was fitted up by a canny San Francisco ship owner in 1898 to carry Yukon-bound gold seekers to Alaska. On May 11, her voyage to Kotzebue Sound almost terminated at Meigg's Wharf when she was challenged (but released) by the skipper of the revenue cutter **Golden Gate.** As the **Coast Seamen's Journal** note put it, "Owing to passenger accommodations having been built on deck, the vessel's tonnage had increased, and Captain Whiteside failed to notify the custom House of the fact" (**Coast Seamen's Journal,** May 18, 1898).

The **Northern Light** is seen lying alongside the Beale Street Wharf in Figure 4.60, her whaleboat davits still in place, but with a huge new deckhouse extending from the foremast to the mizzen. Whether this photograph was taken at the time of the 1898 sailing with the load of Klondike adventurers, or is connected with her 1900 voyage with a load of Nome-bound gold seekers, is uncertain. The captain of the cutter **Golden Gate** might have done well to question more than the tonnage alteration--and indeed, the technicality may have cloaked some decent sense of humanitarian outrage. For in 1899, even gold-crazed Yukon passengers, having higher regard for their well being than to pay for passage aboard the **Northern Light** which was recently fitted up at San Francisco for the lumber trade on the coast, put back to that port after being at sea for one day on account of her leakiness. The crew had been "at the pumps for 24 hours" (Ibid., August 2, 1899).

Presumably the deck house had been removed to accommodate the lumber. We next find the **Northern Light** preparing to sail to Honolulu in March of 1900 with a load of hay, the explanation being, "Hay is selling at that port for $45 a ton." Perhaps the deckhouse had been reinstalled

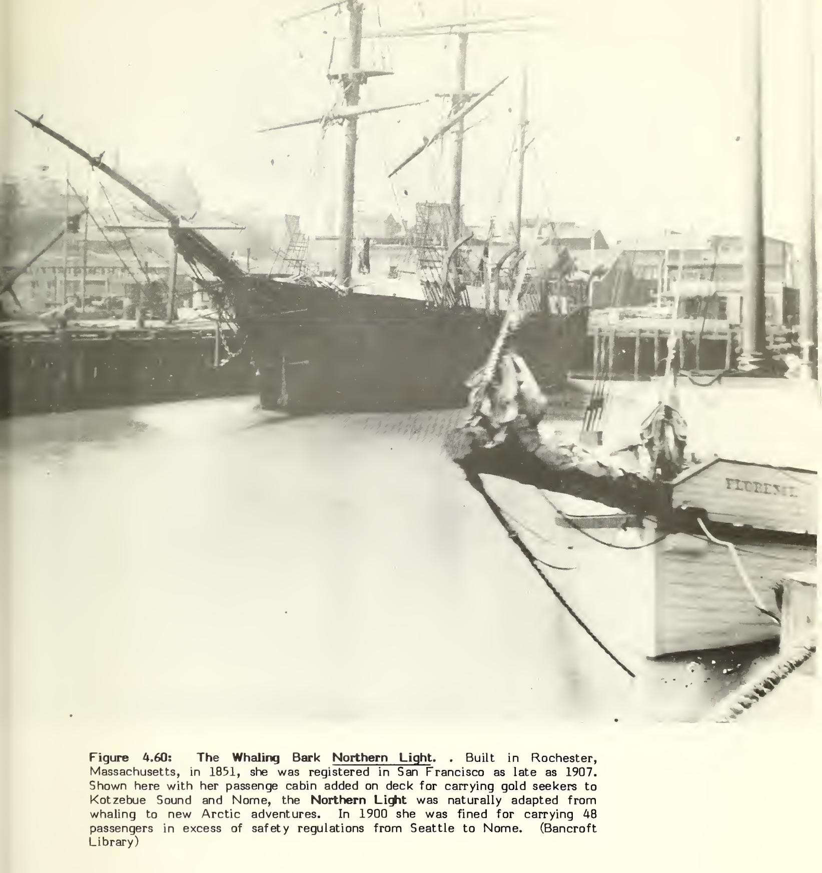


Figure 4.60: The **Whaling Bark** **Northern Light**. . Built in Rochester, Massachusetts, in 1851, she was registered in San Francisco as late as 1907. Shown here with her passenge cabin added on deck for carrying gold seekers to Kotzebue Sound and Nome, the **Northern Light** was naturally adapted from whaling to new Arctic adventures. In 1900 she was fined for carrying 48 passengers in excess of safety regulations from Seattle to Nome. (Bancroft Library)

to protect a part of this astonishingly valuable cargo of hay (presumably about $18,000 worth--delivered). If so, then she was well equipped to sail due north from the tropic isles to Nome. For the next notice in the **Coast Seamen's Journal,** an organ ever alert to maritime malpractice, announced:

> The bark **Northern Light** arrived in Seattle last week from Cape Nome with forty-eight passengers in excess of her license limit. A fine of ten dollars for each passenger was imposed and the forty-eight passengers had their passage-money refunded. The whole charges on the vessel amounted to $2,500 which was paid (Ibid., August 29, 1900).

Had the **Lydia** been purchased by the wrecking company in 1900, the possibility of a Nome adventure would seem higher than in 1901, but it is difficult to say what opportunity may have seemed so attractive at the moment as to suggest the investment in outfitting the vessel. In 1900, the **Coast Seamen's Journal** noted, "A total of 107 American vessels will be engaged in the Alaska trade this summer, of which 48 are steamers and 59 sailing ships." The **Lydia** appears registered with San Francisco as her home port in 1901 in the **List of Merchant Vessels.** The change of name footnotes have been followed page by page through the subsequent lists without notice of the **Lydia.**

Further research can no doubt establish what happened to the **Lydia** between May 25, 1901, and the date of her sinking at the foot of King Street. At this point we can only speculate that it seems unlikely that the **Lydia** was abandoned in the mud of the Pacific Mail Basin until after the beginning of Section 13 of the seawall, early in 1903.

A Brief History of the LYDIA . . . 1840 to 1897

The whaler **Lydia** was assigned the register number 14856, with the signal letters H. M. G. D., and is listed as a bark in the **List of Merchant Vessels.** Built in Rochester, Massachusetts, in 1840, she is shown as measuring 329.77 tons; 104 feet in length by 27 feet in breadth by 18 feet in depth.

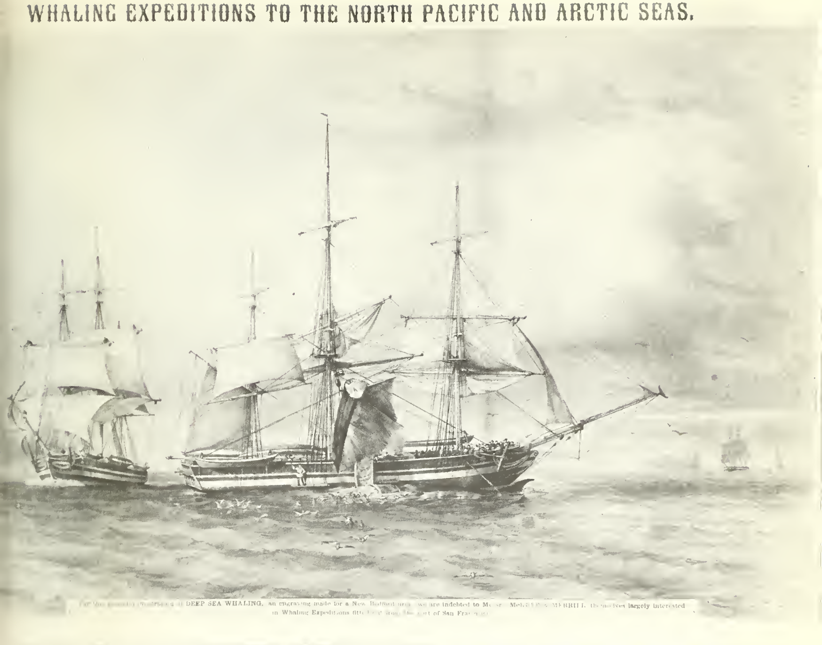
New information on the **Lydia** was received almost at once in response to letters mailed to maritime scholars and whaling museums from New Bedford to Honolulu. Among the interesting information was this note from Richard C. Kugler, director of the Old Dartmouth Historical Society Whaling Museum (June 27, 1980):

> The vessel was built in 1840 by Joseph Meigs & Son in Mattapoisett, which was then part of the town of Rochester. Her registered dimensions were length of 105'6½", breadth 27'4½", depth 13'8¼" and tonnage 351-32/95.

What follows is a table of early voyages, taken from Alexander Starbuck's **A History of American Whale Fishery** and Reginald Hegarty's **Return of Whaling Vessels from American Ports 1876-1923.** According to our records, the **Lydia** was built as a ship, probably much like the whaler seen in Figure 4.61, a painting that probably dates back as early, if not earlier, than the **Lydia**'s New England beginnings. As can be noted on the **Lydia**'s chart of voyages, the **Lydia** was rerigged as a bark in 1864 before she sailed from New London. With bark rigging, the **Lydia** appears in Figure 4.59, a view without identification in the Bancroft Library collection, but positively identified as the **Lydia** in the Mystic Seaport Museum collection. The view shows her laid up in Oakland Creek, a couple of years after her last whaling voyage from San Francisco in 1897.

The waterfront photographer made this portrait of the **Lydia** in 1899, just short of her sixtieth birthday. She was by no means an abandoned hulk in this photograph. Not only was her rigging intact, but the shipkeeper's skiff can be seen secured to a line leading from her bow to some landing on the shore. As compared with the unidentified whaler in Figure 4.49, lying in about the same part of the creek in 1886, the **Lydia** is seen to have a more "modern" rig, probably the result of her extensive reconstruction and refit in 1878, or of her conversion from a ship to bark rig in 1864. She has upper and lower topsails, like the **Andrew Hicks,** seen in about the same Oakland Creek location in Figure 4.48, as compared to the larger single topsails of the whaler drying sails in 1886 (Figure 4.49).

The **Lydia,** it will be noted, has no sails furled to her yards, as does the **Andrew Hicks,** nor whaleboats in the davits. She is snugged down for a long wait. In the early 1900s there were often many sailing ships laid up in Oakland Creek, waiting for a change of one kind or another that made it pay to ship a crew and send them back to sea again. Slack times for shipping produced a spectacular scene in Oakland Creek as can be seen in Figure 4.62, probably taken in 1909. Episodes such as the gold rushes to the Yukon and Nome and the sudden fantastic upsurge in shipping demand


WHALING EXPEDITIONS TO THE NORTH PACIFIC AND ARCTIC SEAS.
[illegible] DEEP SEA WHALING, an engraving made for a New Bedford [illegible] we are indebted to Messrs. [illegible] MERRILL, themselves largely interested in Whaling Expeditions [illegible] of San Fra[illegible]

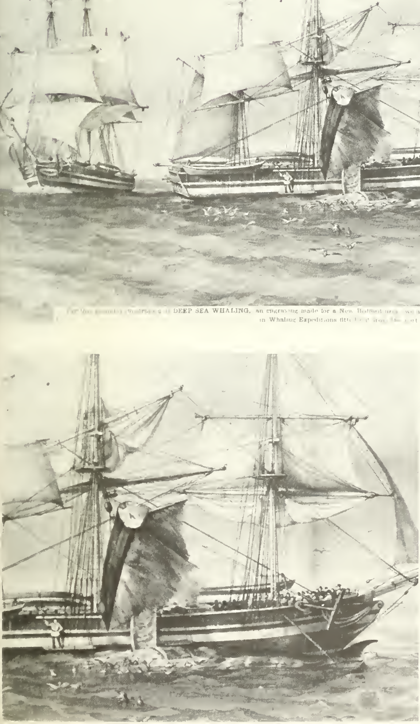


Figure 4.61: Whalers Lasted a Long Time. . .(if they didn't come to grief at sea), and the two seen here may date from 1815-20 or earlier, rather than the **Lydia's** time. However the **Lydia** originally carried a ship rig, like that of the vessel in the foreground, shown in the process of hoisting out the headbone of a baleen whale. (Bancroft Library)

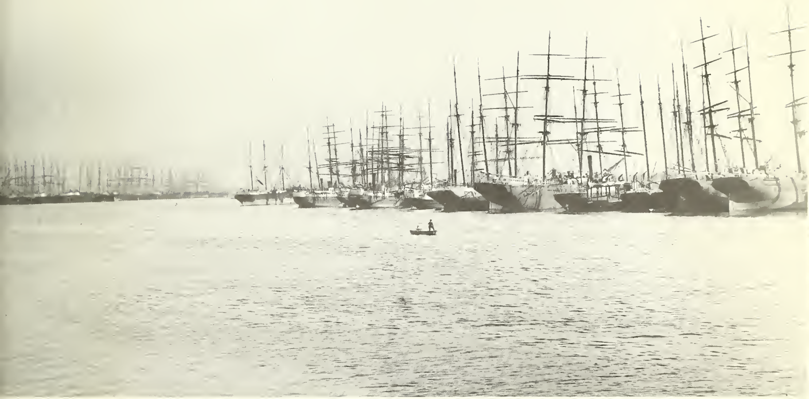
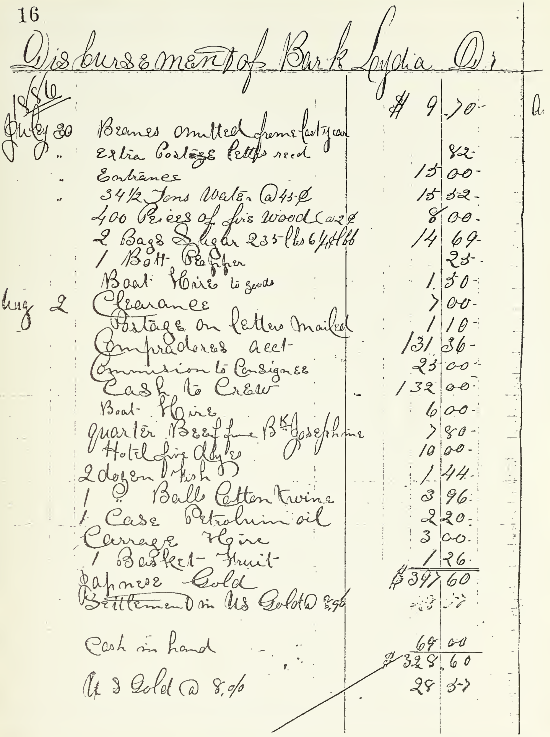


Figure 4.62: Waiting for Better Times--Oakland Creek, 1909. . .Sometimes the fleet of laid-up ships in the estuary grew to astonishing proportions during the last great days of sail. In this view, most of the vessels are "Downeasters"--latter-day American wooden square-riggers, more often than not Maine-built. But scattered in with this fleet of Cape Horners are a few West Coast lumber schooners and several steam whalers. (National Maritime Museum at San Francisco)



16

Disbursement of Bark Lydia Dr

1886		$ 9	70
July 30	Brances omitted frome last year		
"	Extra Postage letters recd		82
"	Entrance	15	00
"	34½ Tons Water @ 45¢	15	52
	400 Pieces of fire wood @ 2¢	8	00
	2 Bags Sugar 235 lbs 6¼¢ lb	14	69
	1 Bott Pepper		25
	Boat Hire to goods	1	50
Aug 2	Clearance	7	00
	Postage on letters mailed	1	10
	Compradores acct	131	36
	Commission to Consignee	25	00
	Cash to Crew	132	00
	Boat Hire	6	00
	quarter Beef from Bk Josephine	7	80
	Hotel five days	10	00
	2 dozen Fish	1	44
	1 [illegible] Balls Cotton twine	3	96
	1 Case Petrolium oil	2	20
	Carriage Hire	3	00
	1 Basket Fruit	1	26
	Japanese Gold	$397	60
	Settlement in US Gold @ 8%	[illegible]	[illegible]
	Cash in hand	69	00
		$328	60
	US Gold @ 8%	28	57

Figure 4.63: When the Lydia Put into Port During an 1886 Voyage. . .her expenses included 34½ tons of water and $132 in cash to the crew. Also purchased were a quarter of beef costing $7.80 and 400 pieces of firewood at 2¢ each. (Mystic Seaport Museum)

of 1914 could put these ships back to work. The men in the skiff at the center (the fellow in the stern dressed in a Sunday suit and hat) may be on their way back to one of these vessels. They are passing the section of "rotten row" occupied by, among other ships, the steamwhaler fleet--five of which, including the **Belvedere** (recognizable by the eagle on her stern), are waiting for a more promising season. Of the steamwhalers, only the **Narwhal** had gone north to winter at Herschel Island in 1906-1907, and hers was the last wintering voyage of a steam whaler after the entire fleet had faced destruction by the ice in the bad winter of 1905-1906.

The Lydia's Account Books: The G. W. Blunt White Library at Mystic Seaport produced still another interesting sidelight on the **Lydia's** history. Several of her returning voyages spoke of the seamen suffering from scurvy--a common complaint from their long months without fresh food. Page 12 from the **Lydia's** account book of the voyage from San Francisco in October of 1884 that returned in November of 1887 is shown in Figure 4.63 for January -- March, and the amounts and kinds of cash outlays are helpful in reconstructing her trip. Among the foods purchased were, "10 bunches of bananas at 40¢, 500 oranges, 400 lbs. of sweet potatoes, 300 lbs. of onions, green market." In addition, they paid a tax on bombs used in killing the whales, a hospital tax, and a Dr. McKibbin's fee of $2.25. Everything from hiring carriages to buying postage stamps was included in the ship's books. Note that $75.00 was spent for gold coin to take to sea.

Page 16 from the **Lydia's** 1886 voyage, July 30 through August, is also of some interest: fresh water (34½ tons) and 400 pieces of firewood, plus sugar, pepper, fish, cotton twine, "beans omitted from last year" and a quarter of beef. Captain McCane may have been the cause of the outlay for a hotel room for five days, $10.00, the carriage hire, $3.00, and the basket of fruit, $1.26. Cotton twine and a case of "petroleum oil" were among the more mundane purchases. The crew must have had shore leave as we have "Cash to the Crew" at $132.00, plus a boat for hire, $6.00. Payment was made, evidently, in Japanese gold, as is noted at the end of the account page.

As noted by the Mystic Seaport Museum registrar's office, this account book was kept by E. J. Smith, the master during a voyage to the

Pacific Ocean whaling grounds. It contains accounts not only of the ship's supplies, but the crew's wages (Misc. vol. 339, Mystic Seaport Museum). Also compiled by Charles R. Schultz, keeper of the manuscripts at Mystic Seaport Museum, is an inventory of the Lawrence & Company Papers from 1822 through 1904. Among these papers are folders 6 through 10, which contain papers related to the bark **Lydia,** some undated, others dated 1863 through 1866. Many of these papers were kept by Master Alfred Turner.

Notes From the Lydia's Papers: The international nature of the whaling vessels' crews was a subject of comment in almost all of the books written about the industry, especially in the early days out of New England, when a ship like the **Lydia** would be gone for voyages lasting three and four years. The Kendall Whaling Museum responded to our request for information on the **Lydia** with the intelligence that they had journals and log books from the 1857 and 1865 voyages, as well as crew lists. The crew list for the **Lydia**'s voyage that appeared in the published **Whalemen's Shipping List and Merchant's Transcript** in New Bedford in November 7, 1865, included the following men. This voyage to the North Pacific would have been the second one made with **Lydia** rigged as a bark.

Captain: Thomas B. Hathaway
First Mate: Charles A. Bowen of Fairhaven
Second Mate: Edward W. Wilson of New Bedford
Third Mate: John Silvia of Fayal (island in the Azores)
Boat Steerers: Nathaniel S. Lewis of Norwich
Mathes Frates of Fayal
Samuel Prent (sic) of Providence
Cooper: Joseph DeRose of Fayal
Steward: Richard W. Baker of Bristol
Cook: John H. Stewart of Philadelphia
Seamen: Frank Henry of St. George
Joseph Silvia of Pico
Antone S. Caspos of Fayal
Joao Peirceria (sic) Leal of Fayal
Manuel Antonio of Fayal
John Silvia Leon of Fayal
Mathis Francisco Mendoza of Flores (island in the Azores)
Manuel Frates of Flores
John Morse of Zanzibar
John William of Callao (Peru)
Joseph Silvester of Quebec
Andrew J. Clark of Providence

Francis E. Sabine of Eastport
Alvin B. Ordway of Worchester
Charles Wilson of Jordan
Charles H. Masterson of Bridgeport
Albert Stevens of Germany
William Kennison of New York

Obviously, the crew had been gathered en route for the voyage, although the captain and first and second mates were out of New England (as was the all important cook); the third mate, cooper, and seven members of the crew were from islands in the Azores.

The history of the **Lydia** lies in many scattered museums in log books, journals, scrimshaw, paintings, letters, and various accounts. Carol Tobal of the Kendall Whaling Museum in Sharon, Massachusetts, patiently culled these excerpts from that museum's pages on the **Lydia:**

> *January 6, 1855 — Begins with a strong wind from S.W., ship by the wind to W.N.W. At 3 p.m., then a new main topsail. At 6 p.m. passed a ship heading SSE. At 7 p.m. saw a ship heading N.E. and exchanged signals with her. She showed English colors, middle and latter part. Light winds from N.W., heading S.W. by South. Latitude by observation 56 degrees, 48 minutes; and longitude by observation, 60 degrees, no minutes.*

The above excerpt is from a partial journal kept by Frederick H. Smith on the ship **Lydia,** out of Fairhaven, when J. W. Leonard was her master. The journal begins at Fairhaven and ends in the Falkland Islands.

A more personalized journal was kept by an unknown crewmember, presumably one of the mates, and dates from **Lydia**'s second voyage rigged as a bark:

> *Tuesday, November 7 (just out of port) 1865— Strong breeze and rugged from N.W. Prudent sail set steering E.S.E. middle and latter part moderate from S.W. All sails set, steering East by South. All hands busy in ship duty. It is enough to discourage a better man than I am just to think what has got to be done to get ready to whale. I am lonesome. (Think how long the night will be; to the eyes that weep for thee).*
>
> *Tuesday, July 24, 1866 — Let me get clear of this ocean, once more, and I don't believe you'll get me here again. I do not want money bad enough to come here after it, and go through*

> *trouble of mind that you have got to go through—ice and bad, cold weather—fogs. I cannot take one moment's comfort.*
>
> *Friday, August 24 — Light wind from N.W. heading eastward. Rainy. At 4 p.m. lowered the boats. We saw no whales but went into the crowd of boats, hard whaling.*
>
> *Middle and latter parts good breeze from the same point. At 3:30 a.m. lowered for whales. Came in thick. Came on board at 7. Cloudy, saw more whales, lowered the boats, could not get back. Came on board at noon and saw 22 whales during the day. Seven cuttings. Latitude 70 degrees and 40 minutes (sic) - and Longitude 169 degrees, 35 minutes west (sic).*

This anonymous journal from the lonesome and unhappy mate started in New Bedford in November of 1865 and ended one year later in the Sandwich Islands, as the **Lydia** headed for the bowhead whale in the North Pacific, eventually to bring back a large haul of 16,898 pounds of whalebone, 1,270 barrels of whale oil, and 33 barrels of sperm oil. The voyage ended in New Bedford in May of 1869--she was out for a total of 44 months. The value of her cargo would have been $20,784.54 for the baleen, plus $45,177 for her oil (figures of cost estimated from Alexander Starbuck). Therefore her total cargo from 44 months of hard sailing was $65,961.54. The system of payment by shares has been described earlier in this report.

The Lydia's Last Whaling Voyage:

An account of the terrible winter of 1897 follows:

> The fall of 1897, for some unknown reason, came exceptionally early, and when the fleet reached the vicinity of Point Barrow they found the way blocked, for the northerly winds had blown the pack ice down on the shores, and the new ice had begun to make. Some of the vessels of the fleet, having made a good catch, had started out early, and got clear just in time; but eight of them--the steamers **Orca, Jessie H. Freeman, Belvedere, Newport, Fearless, Jeannie** and the sailing vessels **Wanderer** and **Rosario**--were caught. This in itself was bad enough, but as they all had expected to reach San Francisco not later than early in the winter, none of the vessels had supplies to enough to last them until spring, the earliest date when help could be expected to reach them, and starvation

> stared the crews in the face. When those of the fleet that had escaped the fatal grip of the ice reached San Francisco early in November, steps were taken to ascertain whether help could not be sent to them . . . . The President decided . . . upon a novel experiment, starting an expedition into the frozen North during the winter . . . . The revenue cutter **Bear** had just returned from Arctic waters, and certain repairs were very much needed; but as she was the best and most available vessel for the trip her commander, Captain Francis Tuttle, was telegraphed on the 10th of November to make all haste to fit her out for the trip north . . . . The plan was for the **Bear** (see Figure 4.64), after forcing her way north as far as possible, to land a party, which was to proceed overland as far as Cape Prince of Wales where they would find several herds of domestic reindeer. These were to be driven up the coast to Point Barrow, to serve as food for the imprisoned whalers . . . (Bertholf 1899: **Harper's,** XCIX, p. 1-3).

Certain winters had taken terrible tolls of the whaling fleet--the winter of 1871, when 33 ships were ground to pieces in the ice, the winter of 1876, when 13 whaling ships were left behind in the northern ice fields--but the winter of 1897 promised to be unique in that it was the first time that United States government relief would be of assistance. The **Lydia** was among the lucky, for she had not sailed with the fleet to Point Barrow.

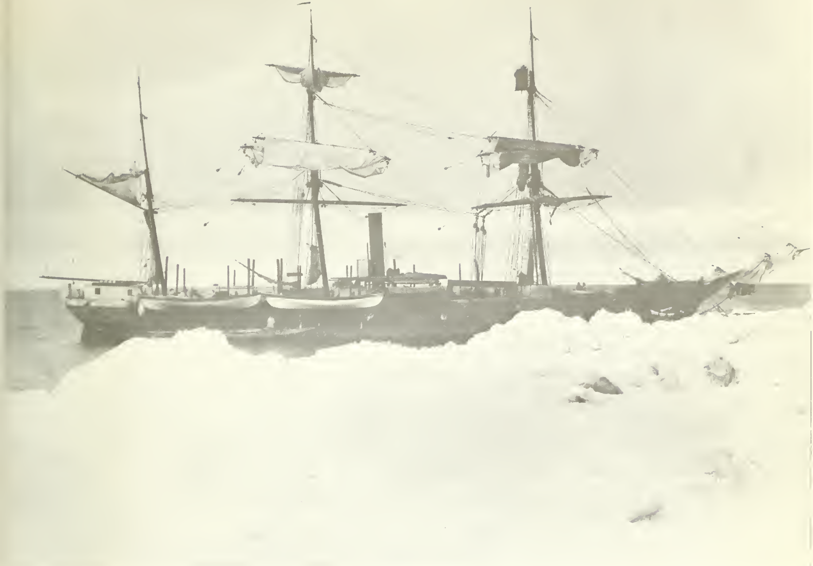
The **Examiner** carried this headlined feature:

RETURN OF THE WHALER, LYDIA

> Only Three Whales Captured in an Eight Month Cruise in the Okhotsk . . . . The American whaling bark **Lydia** commanded by Captain Jenks, came into port today after a tempestuous passage of 35 days from the Okhotsk Sea, where she had cruised during the entire season. This is the first vessel of the fleet of 1897 to return. She has been out for the past eight months and during that time caught only three whales. The catch, which yielded 300 barrels of oil and 4,500 pounds of bone, is consigned to C. J. Henry's Sons & Company. But one whaling vessel was spoken in the sea, the bark **Andrew Hicks,** which reported a catch of three whales.
>
> A succession of heavy gales were encountered by the **Lydia** after leaving the Diana Strait, which carried away several sails. Some of the crew claimed they suffered slight symptoms of scurvy during part of the cruise, induced by the continuous eating of meat. They were apparently in the best of health when seen on the vessel today (**Examiner,** October 27, 1897).

The **Coast Seamen's Journal** added the note, "One of the crew, named John Harding, a plumber by trade, went insane during the voyage. . ." (October 27, 1897). The **Lydia** had been in pursuit of the bowhead whale which carried the most baleen, and this great polar whale (Balaena mysticetus) kept to the Bering, Okhotsk, and the Arctic seas. The Okhotsk Sea is an arm of the North Pacific enclosed by the Kamchatka Peninsula, the Kurile Islands, and Siberia. The product of the returning **Lydia** was like that seen in Figure 4.66 in what appears to be a strange crop of spiky bamboo, but is instead stacks of baleen at San Francisco's Arctic Oil Works. The size of the blurred figure of the workmen by the barrel (lower right foreground) gives some idea of the immense size of the whalebone.

The story of the **Lydia** has only begun to be unraveled. How she spent her last days and came to rest in King Street remain a skeletal tale still fleshed mostly by newspaper briefs, bits of her log books, and the first sleuthings of historians and archaeologists. Perhaps, for instance, the motley assortment of whale hunters shown in a contemporary **Examiner** sketch (see Figure 4.67) are waiting to regain their "land legs" after months in the Artic aboard the aging **Lydia.** Now that the puzzle of the King Street Ship's identity has finally been traced, her full story awaits only further investigation.



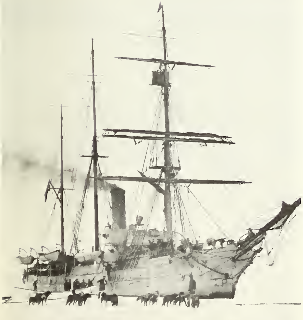


Figure 4.64: The Steam Whaler Alexander Lowers a Boat In the Ice, 1903. . .There was a unique relationship between the whalers in the Arctic and the famous Revenue Cutter **Bear** (seen at left in **Figure 4.65**. "From 1884 to 1926 the **Bear** made the annual trip to the north polar waters, being the floating government of the United States. . . Her Captain was policeman and judge, prosecutor and defender, physician and minister, teacher and mailman to all America's adopted people in the Arctic Circle. For 53 years she has battered the icebergs, rescued the perishing, succored distressed shipping, rushed aid to famine ridden people, carried in the Eskimo school teachers, broken up piracy and poaching amoung the sealers. . . ." (Bancroft Library; U.S. Coast Guard)

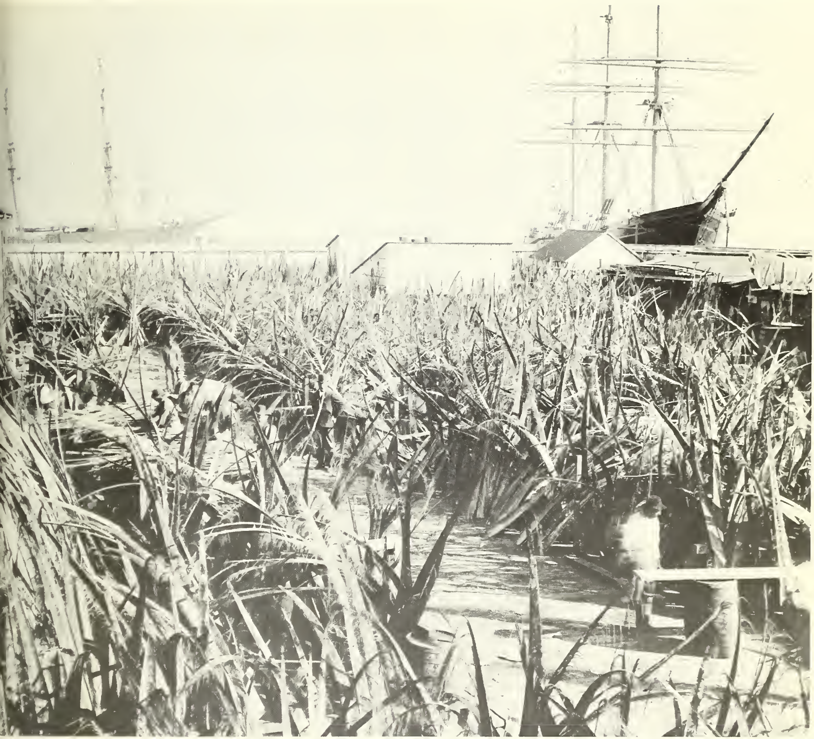
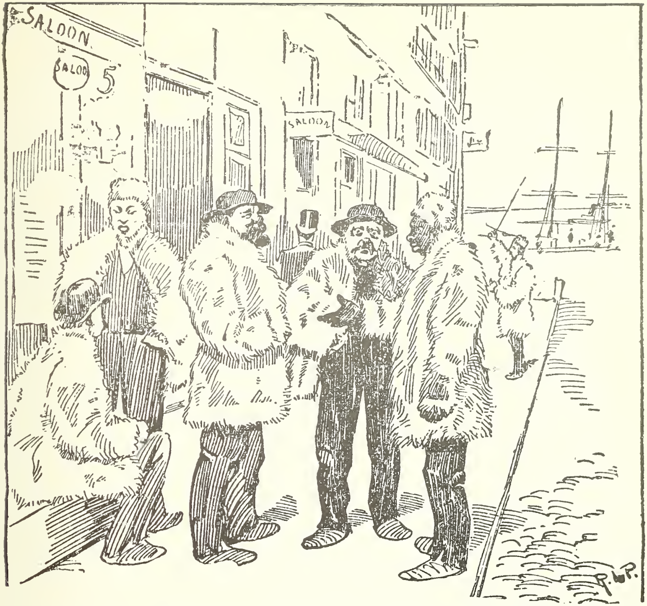


Figure 4.66: **Baleen Drying at the Pacific Steam Whaling Company.** . .Looking like giant palm fronds, the baleen was drying whalebone out in San Francisco's Arctic Oil Works in Potrero. A bonehead whale yielded hundreds of "slabs" of whalebone, often ten and twelve feet in length. More than a ton was usually found in a single whale. Before the Civil War, the price dropped to between 20 and 9 cents per pound--by 1906 it was up to $6.00. Here at the Arctic Oil Works, the bark **J. D. Peters** is loading for eastern markets. In the distant left, the steam whaler **Orca** may be in from Herschel Island. The presence of the **Orca** would date this view to sometime before 1906. (National Maritime Museum at San Francisco)



A GROUP OF WHALE HUNTERS ON HOWARD-STREET WHARF

Figure 4.67: Roxburgh's South of Market Journal (June, 1933), Recalled: About November every year the whaling fleet of about one hundred vessels would arrive from the Arctic. They would lay out in the bay. Some would have a good catch while others would be empty. Those who were successful would, when anchored, begin to hang up their whalebone in the rigging to dry. When dry, it would be bound into bundles and shipped East to market. Sometimes the price would be up and sometimes down, and the same way with the whale oil. Some of the whalers would pay for themselves in one trip while others would go to the Arctic and not make a catch in three or four years. The officers would make big money and the poor sailor only a few dollars. Many of the whalers would fit out as soon as they discharged their cargo and sail and go south in December (where there is fine weather) to break the crew into rowing a whaleboat and do a little whaling. In the spring they would reach Honolulu and get ready to go to the Arctic. Others would remain in San Francisco until spring and then go north. The sailors would be paid off at Wright & Boone's on Steuart Street between Market and Mission (where the Haviside Company is now). Some of the crew would get thousands of dollars and some would only get one dollar for a year's work and one dollar to sign to clear of the ship. When the whaler docked to discharge his cargo of whale oil, they sure kept the coopers busy tightening up the oil barrels. The whalers used to leave a lot of money in San Francisco in purchasing supplies. But alas no more! (S.F. Examiner, 1893, National Maritime Museum, Scraps)

The whaler **Lydia** is by far the most dramatic archaeological find of the San Francisco Wastewater Management cultural resources program. While major components of the vast sewer improvement program have not yet been constructed, and the total cost of the construction program is therefore a matter of estimate and change, the often-expressed $2 billion cost figure will indicate the magnitude of public expenditures involved. Cost-conscious management and prudent professional historical-archaeological work have kept the expenses of potentially huge archaeological investigation and field work programs to a fraction of the potential monies that could have been expended within the funding provisions of federal law.

In the case of the **Lydia** discovery, it would be difficult to conceive a program of cultural resource management that would have cost less than has been the case to date. At the same time, the importance of the find has become more apparent as each step in the investigation has been completed. What could easily have been interpreted at the outset as the remains of "some old barge" have turned out to be part of the otherwise remarkably well-preserved **Lydia**, the oldest American whaling bark known to exist.

With respect to the National Register of Historic Places criteria for evaluation, the **Lydia** meets all four of the major elements, being: (a) associated with events that have made a significant contribution to the broad patterns of our history; (b) associated with the lives of significant persons or groups of people; (c) an embodiment of the distinctive characteristics of a type, period, or method of construction . . . that represent a significant and distinguishable entity; and (d) yielding or likely to yield information important in . . . history (See 36 Code of Federal Regulations 60.6).

As is apparent from the foregoing report, physical examination of the almost intact portion of the bark has not yet been accomplished; only the surface has been scratched, as it were, by the test excavation of March, 1980. It is equally apparent that because of limited funding and the eleventh hour identification of the exact ship found in King Street, only the barest profile of the life of the **Lydia** and the people associated with her history from builders and masters, to crewmen and owners, has been, in effect, tagged on to the story of this project. Nor has the story of whalers sailing out of San Francisco been more than touched upon, for the same reasons. Full visual data on the construction of the vessel has yet to be gathered, a most important element in its potential contribution to maritime scholarship which up until now has had only the **Charles W. Morgan** as an example of American wooden ship construction of her period.

The Goal of Public Historical Archaeology

Before making recommendations for the **Lydia**, as nominated to the National Register of Historic Places (see Appendix A)--and the only archaeological object so nominated in the historical archaeological program of the Wastewater Management program to date--serious consideration must be given to the goal of public-funded historic archaeology. The preservation of a significant cultural resource such as the **Lydia** must have as its aim something more than the saving of a bit of idiosyncratic American culture. If this were the case, the presence of the **Charles W. Morgan** on the East Coast of the United States might well serve as a valid reason to do no more because, "we have a whaler." But San Francisco today is in a unique position vis-a-vis the **Lydia**. As this report was being written, the Congress of the United States authorized the purchase of the largest and most wide-ranging private collection of American whaling artifacts for public exhibition, scholarly study, and perpetual curation at the National Maritime Museum at San Francisco.

It was the intent of the Congress of the United States as expressed in the National Historic Preservation Act of 1966 "that the spirit and direction of the Nation are founded upon and reflected in its historic past, and that the historic and cultural foundation of the Nation should be preserved as a living part of our community life and development . . ." (36 Code of Federal Regulations, part 60.1). The Congress by authorizing the purchase of the Johnson Whaling Collection for the National Maritime Museum at San Francisco made yet another direct action that carried out the intent of preserving our historic artifacts for public appreciation and education. If it had not so moved, this valuable collection could well have been auctioned off and dispersed.

It is a stroke of public fortune beyond reasonable expectation that the largest and most dramatic artifact belonging in any comprehensive American whaling collection should appear at this precise time in a federally funded project on publicly owned land in San Francisco's waterfront itself. There is particular force and appropriateness, then, in developing recommendations that meet the challenge of the situation at hand.

The service of the public interest is strikingly obvious in considering the challenge of recommendations for the future of the **Lydia.** Thus the public must be defined beyond the rather narrow limits of maritime scholarship or the archaeological community. It is a public that reaches far beyond the inhabitants and borders of San Francisco itself. As the expenditure of public funds must be considered most carefully, the widest public benefit must be the basis of the program recommended for the future of the **Lydia.**

Recommendations

The first consideration is how best to present the **Lydia** to the widest public as an integrated part of the great whaling collection of the National Maritime Museum at San Francisco.

I. The stern of the **Lydia,** that section lying south of the south wall of the King Street (C-2) sewer, should be excavated under qualified historical-archaeological and maritime historical supervision. This excavation will serve several important public purposes:

> (a) The archaeological excavation will serve as a training classroom for historical archaeologists and maritime curators, functioning as one of the most professionally interesting and instructive historical archaeological field projects in America.
>
> (b) The full extent of the physical condition of the probably intact stern section, as well as the partially destroyed bow section north of the sewer, should be determined. This determination will
>
> (c) permit full data recovery with regard to the lines and construction details of the **Lydia** itself as well as interpretation of any artifacts associated with the bark and the circumstances

of her abandonment at the foot of King Street, in the old Pacific Mail Dock Basin.

(d) At the same time precise and practical assessment of the extent of the hull that should be removed for permanent exhibition with the whaling collection can be made. Given our present scanty physical knowledge of the hull, it is highly probable that the entire stern section of the bark from abaft the main rigging is remarkably intact.

An **in situ** exhibit of the **Lydia** does not appear desirable or practical for compelling reasons: (1) the stern section of the **Lydia** lies almost entirely below the local watertable and extends under the fill constituting a portion of the Embarcadero; (2) The unity of the hull section has been impacted by the sewer excavation and the consequent removal of a mid-section, and by damage (of undetermined extent) to the upper portion of the bow section when the land was filled in 1907; (3) The circumstances are such that indoor curation and public exhibition of the most intact section are particularly desirable in connection with the existence and development of the Johnson Whaling Collection at the National Maritime Museum.

II. The life of the **Lydia** should be told. This history should be brought together from the vast but scattered resources of the museums, libraries, and private collections that hold her papers, her portraits, the stories of her men, her voyages, and manner of information relevant to the **Lydia's** place in America's great whaling industry of New England and the Pacific. All types of media should be used to tell the story of the **Lydia** so that it reaches out to a wide American public.

III. There is an astonishing revival of interest in America today in the high crafts of our past and in simple technologies masterfully employed in sailing wooden ships to every corner of the seas. The **Lydia** affords the data base as well as the physical reality and the evocative stimulation for the building of **Lydia II**--a full sized replica intended to carry the message of our past to all of those seaports of America to which the National Maritime Museum itself is dedicated.

Historic ships moored at San Francisco's Aquatic Park or housed in the museums of the world can only communicate within the limits of where they are. As demonstrated by the Tall Ships Bicentennial Program--which appears to have out-lived the initial inspiration to become an on-going program of periodic celebration--the effect and appeal of a ship under sail, still the master of her element, has captured the imagination of America as few historical events have ever done. The little San Francisco Bay scow schooner **Alma**, with her ability to take sail to such "distant" ports at Petaluma and Antioch, California, has inspired popular enthusiasm far beyond her comparative cost and importance in the historic fleet that remains moored at the National Maritime Museum at San Francisco. Demand for sailing appearances and living history programs far exceeds her physical capacity to respond.

It would be nearly impossible to reconstruct a historic vessel more appropriate and suitable to actual sea-going activity, youth training, and port-to-port visitation than the **Lydia.** (1) The vessel is big enough (about the size of the **C. A. Thayer** at the National Maritime Museum) to handle large numbers of visitors. (2) With her deep hull with two decks, the **Lydia** has the space for a crew of 50 or more, together with all stores and exhibition materials that might be desired. (3) It is yards and squaresails more than any other single factor that enliven the public imagination and sensitize it to the authenticity and reality of the historic American Merchant Marine. As square-rigged ships go, a whaler like the **Lydia** is what sailors called "a handy vessel"--that is, she can be navigated under sail in close quarters. Futhermore, her hull design is also conducive to this handiness as well as to easy motion at sea and great seaworthiness. (4) Four or five 30-foot whale boats, ready for instant launching and demonstration of the more intimate skills of personal seamanship and boat management, are not found in connection with vessels built to carry lumber or general cargo. The **Lydia**'s extensive spread of square canvas, together with the 30-foot whaleboats, would give an over-sized crew of greenhorns plenty of opportunity for practical experience. (5) If the **Lydia** sounds like a lot of ship, in fact, she is an ideal size for a full-scale replica. All the attributes of a merchant sailing ship she has, and more, but she is in fact a fraction of the size of the big steel square-riggers of the Tall Ships fleet of training vessels.

Building the **Lydia II** herself would be a vital experience for both public exhibition and shipwright training at Aquatic Park, where the National Maritime Museum has long considered the installation of a marine railway and repair yard for its present fleet of historic ships. All of the nineteenth century craftsman's arts of the type performed in largely demonstration settings at old Williamsburg or Mystic Seaport or other successful "living museums" would have a focus and a purpose, both visible and understandable, to all kinds of publics.

IV. The heroism and determination of the whaling masters and the crews of the past have been matched in the popular consciousness by the growing awareness of threatened extermination of the most mysterious and largest of earth's mammals by modern factory ships cruising the seas for dogfood and fertilizer. A vital part of these recommendations then is that the **Lydia II** at sea, and the **Lydia I**, excavated and in place with the great whaling exhibit at the National Maritime Museum, should both educate the public and realize contributions towards the saving of the whales themselves. It is a fitting full circle. A consciousness of the American whaling industry of the past should sharpen a sense of the exploitation of the world's environment. A natural outgrowth of a better understanding of the whaling industry is a continued study of the whale and the great oceans of the world. **Lydia II** might participate in just such studies. As well, she might help bring together many diverse institutions and individuals with a common vision, understanding, and goal.

ACKNOWLEDGEMENTS

A project that extends over several years tends to gather a wide range of experts, researchers, and other interested and helpful people who have in common an enthusiasm for ships or a taste for unraveling mysteries. The search for the **Lydia**'s identity has been characterized by such maddening blind alleys as the notched nameboard (which if relevant would have cut off months of microfilm reading), but it has also been characterized by some major breakthroughs in the study that were due to individual persistence and insight. Certainly, for the historians, Ray Aker's ability to establish the bark's dimensions from the removed section and his further insight after the March, 1980, test excavation that we had a whaler to trace were major breakthroughs that made the success of this archival search even possible. Again, Ray Aker's ability to project the appearance of the **Lydia** in his interpretive engineering drawings have been not only instructional but inspirational as well. Like the work of so many scholars, his contribution to this report could never be reimbursed in terms of his time, but an appreciation of his scholarship seems totally appropriate here.

We have been encouraged and impressed by the interest in the project shown by William Baker of M.I.T. and his continuing helpful suggestions about where next to turn. Captain Fred Klebingat's inspection of the removed section of the vessel and his delightful and thoughtful letters from Coos Bay represent some of our best moments in this frequently frustrating trek. We have received support and understanding, not to mention some theoretical breakthroughs, from Chris Chaloupka of the State Water Resources Board to whom the **Lydia**'s identity became almost as much an obsession as it was with us.

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From a reseach viewpoint, librarians again and again prove helpful, but we have special regard for the staff and librarians from the National Maritime Museum at San Francisco--Dave Hull, Justice Schulz, and Barbara

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We particularly appreciate letters and calls from the following East Coast museums after our eleventh hour request (over the fourth of July at that) for help on the **Lydia** discovery: Richard C. Kugler of the New Bedford Whaling Museum; Carol Tobal of the Kendall Whaling Museum in Sharon, Massachusetts; Richard Malle of the Mystic Seaport Museum; Mark Sexton of the Peabody Museum of Salem, Massachusetts. And lest we forget, the American Forest Products Laboratories which established the **Lydia**'s East Coast origins, and William Robinson of Towill Associates who did the photogrammetric studies of the vessel in King Street.

Prepared by Archeo-Tec, Oakland, California
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Front cover: In 1881, a long grain shed already capped the newly completed section of San Francisco's seawall at North Point. Years passed before the lagoon behind it was completely filled and graded. (Society of California Pioneers)

Back cover: Ceramic food jars, tableware, and tea pots found in the landfill behind the seawall suggest that men living in San Franciso's crowded Chinatown steadfastly maintained their native culinary and social traditions. (Arnold Genthe, California Historical Society)

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